HORTICULTURAL ABSTRACTS

VOL. 26, 1956

Prepared by
COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS,
EAST MALLING, KENT

Published by
COMMONWEALTH AGRICULTURAL BUREAUX, FARNHAM ROYAL,
BUCKS, ENGLAND

INVICTA PRESS
HEADLEY BROTHERS LTD
109 Kingsway London WC2
and Ashford Kent

The Commonwealth Bureau of Horticulture and Plantation Crops

Its administration, links with the Commonwealth and Scientific Staff, March 1956

The Bureau is one of a group of Bureaux and Institutes covering the following subjects: agricultural parasitology, animal breeding and genetics, animal health, animal nutrition, biological control, dairying, entomology, forestry, horticulture and plantation crops, mycology, pastures and field crops, plant breeding and genetics and soil science, organized under the:

EXECUTIVE COUNCIL COMMONWEALTH AGRICULTURAL BUREAUX

Member	*Representing*
J. E. C. Coventry, B.A., M.Sc. (*Chairman*)	Federation of Rhodesia and Nyasaland
C. E. Lambert, C.M.G. (*Vice-Chairman*)	Colonial Territories
W. C. Tame	United Kingdom
J. G. Malloch, M.B.E. Ph.D. (*Acting*)	Canada
W. Ives, M.Ec.	Australia
V. Armstrong, B.Sc., Ph.D., D.I.C.	New Zealand
E. D. Andrews (*Acting*)	Union of South Africa
T. Swaminathan, I.C.S.	India
	Pakistan
B. F. Perera, C.M.G., O.B.E.	Ceylon
Sir Herbert Howard (*Secretary*) Farnham House, Farnham Royal, near Slough, Bucks.	

The Executive Council of the Commonwealth Agricultural Bureaux is a signatory to the Fair Copying Declaration, details of which can be obtained from the Royal Society, Burlington House, London, W.1.

COMMONWEALTH AGRICULTURAL BUREAUX LIAISON OFFICERS

United Kingdom:
Until March 31st
A. B. Bartlett, Ministry of Agriculture, Fisheries and Food, Great Westminster House, Horseferry Road, London, S.W.1.

From April 1st
W. Ness, Assistant Secretary, Agricultural Research Council, Cunard Building, 15 Regent Street, London, S.W.1.

Canada:
H. L. Trueman, B.S.A., Director, Administrative Services, Department of Agriculture, Ottawa, Ontario.

Australia:
G. B. Gresford, B.Sc., A.R.A.C.I., Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, E. Melbourne, C.2, Victoria.

New Zealand:
N. A. Marris, M.Sc., Department of Scientific and Industrial Research, Information Bureau, P.O. Box 8018, Government Buildings, Wellington, C.1.

Union of South Africa:
S. C. Potgieter, c/o Secretary for Agriculture, Agriculture Buildings, P.O. Vallis, Pretoria, Transvaal.

India:
Shri M. S. Randhawa, M.Sc., F.N.I., I.C.S., Vice-President, Indian Council of Agricultural Research, Multistoreyed Building, Queen Victoria Road, New Delhi.

Pakistan:
Taskhir Ahmad, Ph.D.(Cantab.), Director, Department of Plant Protection, Government of Pakistan, Karachi.

Ceylon:
A. J. Joseph, B.A.(Hons.), Assistant Secretary, Ministry of Agriculture and Food, Colombo 2.

Federation of Rhodesia and Nyasaland:
G. R. Bates, Ph.D.(Lond.), Chief Botanist and Plant Pathologist, Department of Research and Specialist Services, P.O. Box 8100, Causeway, Southern Rhodesia.

Colonies:
Sir Geoffrey F. Clay, K.C.M.G., O.B.E., M.C., B.Sc., N.D.A., N.D.D.(Hons.), Agricultural Adviser to the Secretary of State, Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1.

Sudan:
The Chief of the Research Division, Ministry of Agriculture, Wad Medani.

Republic of Ireland:
S. M. Breathnach, Department of Agriculture, Dublin.

OFFICIAL CORRESPONDENTS OF THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

Aden Protectorate:
The Director of Agriculture.

Australia:
W. A. T. Summerville, D.Sc., Director, Department of Agriculture and Stock, William Street, Brisbane, B.7, Queensland, and F. M. Read, M.Agr.Sc., Department of Agriculture, Melbourne, Victoria.

Bahamas:
The Colonial Secretary, Nassau.

Barbados:
Agronomist, Department of Science and Agriculture.

Basutoland:
Director of Livestock and Agricultural Services, Department of Agriculture, Maseru.

Bechuanaland:
Director of Agriculture, Department of Agriculture, Mafeking, Cape Province, South Africa.

Bermuda:
Director of Agriculture, Agricultural Station, Paget East.

British Guiana:
Director of Agriculture, Department of Agriculture, Georgetown.

British Honduras:
Director of Agriculture, Department of Agriculture, P.O. Box 149, Belize.

Brunei:
The State Agricultural Officer.

Canada:
H. Hill, B.S.A., M.Sc., Ph.D., Chief, Horticulture Division, Experimental Farms Service, Central Experimental Farm, Ottawa, Ontario.

Ceylon:
A. V. Richards, M.Sc.(Calif.), B.Sc.(Lond.), Dip. Agric.(Cantab.), A.I.C.T.A.(Trin.), Horticultural Officer, Department of Agriculture, Peradeniya.

Cyprus:
W. Alan, Director of Agriculture, Nicosia.

Fiji:
B. E. V. Parham, O.B.E., M.A., Senior Agricultural Officer, Suva.

Gold Coast:
P. S. Hammond, M.B.E., Assistant Director of Agriculture, Department of Agriculture, Bunsu, via Bosuso.

Hong Kong:
Director of Agriculture Forestry and Fisheries.

India:
B.N. Uppal, Ph.D.(Iowa), F.N.I., The Agricultural Commissioner with the Government of India, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi.

Republic of Ireland:
Prof. G. O. Sherrard, A.R.C.Sc.I., Albert Agricultural College, Glasnevin, Dublin.

Jamaica:
Director of Agriculture, Kingston.

Kenya:
T. H. Jackson, Dip. Hortic., Agricultural Officer (Horticulture), Fruit Experiment Station, P.O. Box 100, Molo, Kenya.

Leeward Islands:
W. E. Bassett, M.B.E., Agricultural Superintendent, Montserrat.

Federation of Malaya:
Director of Agriculture, Department of Agriculture, P.O. Box 1004, Kuala Lumpur.

Mauritius:
Deputy Director of Agriculture, Reduit.

New Zealand:
A. M. W. Greig, B.Sc., N.D.H., Director, Horticulture Division, Department of Agriculture, Vickers House, Woodward Street, Wellington.

Nigeria:
Research Adviser, Agricultural Department, Moor Plantation, Ibadan.

North Borneo:
Director of Agriculture (*ex-officio*), Jesselton.

Northern Rhodesia:
Director of Agriculture, P.O. Box 660, Lusaka.

Nyasaland:
S. T. Hoyle, The Agricultural Research Station, P.O. Lilongwe, Nyasaland.

Pakistan:
Syed Mohamed Ibrahim Shah, M.Sc.(Utah), M.Sc.(Bristol), Fruit Development Adviser, Block No. 18/1 Pakistan Secretariat, Karachi.

Sarawak:
Director of Agriculture, Kuching.

Seychelles:
Director of Agriculture, Department of Agriculture, Victoria. Mahé.

Sierra Leone:
The Horticulturist, Department of Agriculture, Freetown.

Somaliland:
Director of Agriculture and Veterinary Services, Hargeisa.

Southern Rhodesia
C. N. Hayter, F.I.P.A.(S.A.), Government Horticulturist, Department of Research and Specialist Services, P.O. Box 8025, Causeway.

St. Helena:
The Agricultural and Forestry Officer.

Sudan:
Wadie Habashi, Dip. Agric.(Khartoum), Director of Agriculture, Ministry of Agriculture, Khartoum.

Swaziland:
Principal Veterinary and Agricultural Officer, Department of Agriculture, P.O. Box 21, Bremersdorp.

Tanganyika Territory:
Senior Research Officer, Coffee Research and Experimental Station, Lyamungu, P.O. Moshi.

Trinidad:
B. G. Montserin, Ph.D., M.Sc., B.S.A., Deputy Director (Research), Department of Agriculture.

Uganda:
The Senior Botanist, Department of Agriculture, Kawanda.

Union of South Africa:
F. G. Anderssen, B.Sc., Ph.D., Chief, Division of Horticulture, Department of Agriculture, P.O. Box 994, Pretoria.

Windward Islands:
Grenada: Superintendent of Agriculture, Department of Agriculture, St. George.
St. Lucia: Agricultural Superintendent, Department of Agriculture, Castries.
St. Vincent: Agricultural Superintendent, Department of Agriculture, Kingstown.

Zanzibar:
G. E. Tidbury, B.Sc.(Lond.), A.R.C.S., A.I.C.T.A., Senior Agricultural Officer, Department of Agriculture.

HORTICULTURAL ABSTRACTS

Vol. XXVI March 1956 No. 1

Initialled abstracts and reviews not by Bureau staff are by R. J. Garner, E. S. J. Hatcher and S. C. Pearce of the East Malling Research Station, Prof. K. Mather of Birmingham University and G. St.C. Fielden.

INDEX OF CONTENTS.

Nos.
Miscellaneous Abstr. 116. Noted 38 .. 1-118l
General 1-10
Experimental technique 11-14
Breeding and genetics 15-16
Pollen and nectar 17-18
Climate and air pollution 19-26
Biochemistry 27-38
Physiology 39-50
Growth substances 51-68
Propagation 69-76
Seeds 77-79
Soil problems and irrigation .. 80-87
Nutrition 88-96
Soilless culture 97-98
Artificial illumination 99-102
Glasshouses and frames 103-113
Equipment 114-116
Noted 117a-118l

Tree Fruits, Deciduous
Abstr. 141 Noted 30 119-261d
General 119-125
Breeding and varieties 126-143
Propagation and rootstocks .. 144-168
Pollination 169-173
Planting 174-175
Training and pruning 176-182
Growth and physiology 183-196
Spraying for cultural purposes .. 197-205
Nutrition, soil management and irrigation 206-222
Harvesting, grading and packing .. 223-228
Storage 229-249
Composition of fruit 250-259
Noted 260a-261d

Small Fruits, Vines and Nuts
Abstr. 64. Noted 20 262-326t
Small fruits 262-283
Vines 284-313
Nuts 314-325
Noted 326a-326t

Plant Protection of Deciduous Fruits
Abstr. 118. Noted 26 327-445z
General 327-331
Disturbances of nutrition or of unknown origin 332-341
Climatic factors 342-353
Viruses 354-360
Bacteria 361-362
Fungi 363-394
Nematodes 395-397
Mites 398-405
Insect pests 406-426

Nos.
Birds 427
Rodents 428
Fungicides and insecticides .. 429-437
Spray apparatus and technique .. 438-444
Noted 445a-445z

Weeds and Weed Control
Abstr. 77. Noted 17 446-523r
General 446-449
Particular weeds 450-459
Control of aquatic weeds 460-463
Control of woody plants 464-470
Weed control in fruit crops .. 471-473
Weed control in ornamentals and nurseries 474-475
Weed control in tropical crops .. 476-478
Weed control in turf 479-487
Weed control in vegetables 488-514
Herbicides and apparatus 515-522
Noted 523a-523r

Vegetables, Temperate, Tropical and Glasshouse Abstr. 208. Noted 38 524-733l
General 524-550
Asparagus 551
Brassicas 552-571
Celery 572-573
Cucurbits 574-594
Legumes 595-635
Mushrooms 636-640
Okra 641
Onions and related crops 642-659
Rhubarb 660
Root crops 661-676
Salad crops 677-686
Spinach 687-690
Tomatoes, eggplants and capsicums 691-731
Noted 732a-733l

Tobacco Abstr. 68. Noted 22 734-802v
General 734-736
Breeding, selection and varieties .. 737-745
Seedbed and cultural practices .. 746-752
Nutrition and irrigation 753-765
Physiology 766-773
Composition and quality 774-781
Diseases and pests 782-799
Curing and fermentation 800-801
Noted 802a-802v

Miscellaneous Temperate and Tropical Plants
Abstr. 62. Noted 24 803-865x
Culinary and spice plants 803-812
Drug plants 813-822

Nos.
Essential oils .. 823-827
Fibres .. 828-832
Gums and mucilage plants .. 833-834
Hops .. 835-844
Insecticidal plants .. 845-847
Plant sources of antibiotics .. 848-850
Rubber plants .. 851
Seed oils .. 852-859
Sundry plants .. 860-864
Noted .. 865a-865x

FLORICULTURE Abstr. 108. Noted 41 866-975o
General .. 866-882
Annual and herbaceous plants .. 883-900
Bulbs, tubers, etc. .. 901-924
Lawns .. 925-926
Succulents .. 927-929
Roses .. 930-940
Other trees and shrubs .. 941-973
Noted .. 974a-975o

SUB-TROPICAL FRUIT AND PLANTATION CROPS Abstr. 92. Noted 23 976-1068w
Avocadoes .. 976-978
Citrus—production, varieties and propagation .. 979-985
Citrus—planting, pruning and growth phenomena .. 986-993
Citrus—composition, nutrition and irrigation .. 994-1006
Citrus—air pollution, diseases and pests .. 1007-1023
Citrus—pre-harvest treatments and harvesting .. 1024-1027
Citrus—packing and storage .. 1028-1038

Nos.
Dates .. 1039-1045
Litchis .. 1046-1047
Olives .. 1048-1056
Passion fruit .. 1057-1059
Persimmons .. 1060-1063
Tung .. 1064-1067
Noted .. 1068a-1068w

TROPICAL FRUIT AND PLANTATION CROPS Abstr. 165. Noted 49 1069-1235w
General .. 1069-1077
Banana .. 1078-1089
Cacao .. 1090-1128
Cinchona .. 1129
Cloves .. 1130-1131
Coconuts .. 1132-1141
Coffee .. 1142-1151
Mangoes .. 1152-1155
Oil palms .. 1156-1162
Papaws .. 1163
Pineapples .. 1164-1173
Rubber trees .. 1174-1190
Sugar cane .. 1191-1215
Tea .. 1216-1230
Sundry crops .. 1231-1233
Noted .. 1234a-1235w

NOTES ON BOOKS AND REPORTS Abstr. 49. Noted 23 1236-1285w
Books .. 1236-1254
Annuals and reports .. 1255-1281
New periodicals .. 1282-1284
Noted .. 1285a-1285w

Total abstracts 1268. Noted 351.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

EDITORIAL NOTES

THE 5-YEAR INDEX TO VOLUMES 21-25

May we incur the risk of being intolerable bores by emphasizing to those readers who subscribed to Vol. 25 the value of the 5-year index, which they will shortly receive, for the purpose of running down articles published in recent years on their several problems. We do not want to avoid work, but we do suggest that many a reader could save himself trouble by quick reference to the index and individual abstracts in Vols. 21-25.

RISING COSTS

We infinitely regret that, owing to heavy increases in the costs of paper and printing, the subscription to *Horticultural Abstracts* will be raised as from Vol. 27, 1957, to 70s. a volume (U.S.A. and Canadian $9·8) with usual discount to direct subscribers within the Commonwealth.

14th INTERNATIONAL HORTICULTURAL CONGRESS HELD AT SCHEVENINGEN, THE NETHERLANDS, 29th AUGUST-6th SEPTEMBER, 1955

Many person who were unable to attend this Conference will be interested in its work.

We are, therefore, by kind permission of the Secretariat, publishing in this number very short indicative abstracts of the papers given. The papers will form part of the published Proceedings.

The Proceedings will be published by, and obtainable from, Messrs. H. Veenman & Zonen, Wageningen, Netherlands, as from October, 1956, at 38 Neth. guilders, post free [at g. 10.62 = £1 sterling, 38 guilders = approx. 71s. 6d.].

NOTES OR BIBLIOGRAPHIES AVAILABLE

In 1955 73 readers asked for and received stencilled copies of bibliographies or notes listed in Horticultural Abstracts Vol. 25, No. 1, and 270 items were distributed in response to their requests.

Below are listed 31 similar stencils compiled in answer to enquiries in 1955. As before they will be available to those interested so long as the supply lasts, but experience suggests that some items at least will go rather fast.

Interested readers should write direct to us [NOT to C.A.B., Farnham Royal] merely quoting the Query File No. Not more than one copy can be sent to any one individual.

Query File No.	*Subject.*	*Information given.*
2453	Brief review of **Literature on the cashew nut**	11 pages + 210 references
2724	Translation of article by Stellwaag in *NachrBl. dtsch. PflSchDienst*, 1953, No. 5 on *Reisigkrankheit* [= **court noué or infectious degeneration?**]	6 pages
2729	Indexed bibliography on **The use of plastics in horticulture**	112 references and 1 page index
2730	Bibliography on **Water relations of annuals and biennials**	32 references
2736	Notes and bibliography on **Peach varieties in relation to their tolerance to warm winters**	10 pages + 22 references
2747	Notes and annotated bibliography on **Prevention of hail damage by rockets or ground generators**	1 page + 13 references
2754	Notes and bibliography on **Short-day onion varieties of good keeping quality**	2 pages + 12 references
	and Annotated bibliography on **Storage of onions**	55 references
2759	List of **Short translations made by the Commonwealth Bureau of Horticulture and Plantation Crops January 1949-February 1955**	47 translations
2769	Notes and bibliography on **Methods of improving colour in dessert apples with chemicals (other than fertilizers) and with light**	1 page + 32 references
2771	Annotated bibliography on **Atomic energy and its application in horticulture**	179 references
2772	Notes and bibliography on the **Preparation and storage of coffee seed**	1 page + 10 references
2782	Notes and bibliography on **Water relations of fruit trees with reference to flower bud differentiation, flowering and fruit drop**	3 pages + 16 references
2787	Bibliography on **"Juvenility" in plants, mainly fruit trees**	25 references
2793	Bibliography on **Sisal**	105 references
2795	Translation of German article by G. Krüssmann on **Rootstocks for stone fruits (except cherries)**	5 pages
2804	Notes and bibliography on the **Horticultural uses of vermiculite** and a note on **Perlite**	2 pages + 36 references
2808	Note and bibliography on **Weed control in fruit and ornamental tree and shrub nurseries**	3 pages + 25 references
2809	Notes and bibliography on **Mist propagation of cuttings**	4 pages + 48 references
2810	Annotated bibliography on **Use of aircraft for treating horticultural and plantation crops**	88 references
2811	Annotated bibliography on **Antibiotics: treatment of diseases and pests**	210 references
2814	Annotated bibliography on **Gerberas**	12 references
2821	Annotated bibliography on **Chlorosis of azaleas and gardenias**	9 references
2822	Notes and bibliography on **Recent general recommendations on fertilizing roses**	2 pages + 7 references
2823	Notes and bibliography on **Recent general recommendations on fertilizing citrus**	4 pages + 14 references
2839	Notes on **Care of cut holly.** Memo. by J. H. Crossley	1 page
2867	Notes and bibliography on **Prolonging the life of cut flowers**	2 pages + 46 references
2870	Annotated bibliography on ***Pistacia vera***	48 references
2873	Translation of article by Franco in *Bragantia* Vol. 9, 1949, on **Mineral deficiency in coffee**	6 pages

Query File No.	*Subject.*	*Information given.*
2874	Notes and bibliography on **Flower initiation in strawberry and the effect of planting time on yield**	2 pages + 38 references
2876	Bibliography on **Dwarfing, frost-hardy apple rootstocks**	14 references
2879	Notes and bibliography on **Absorption and utilization of nitrogen (as ammonia and nitrate ions) by apple roots**	1 page + 19 references
2899	Bibliography on **Forcing of ornamental plants**	40 references
2901	Note on **Biuret, a toxic impurity of urea**	1 page + 8 references

SALIENT ITEMS. Vol. 26. No. 1.

BULK AND COMPLEXITY.

General:—No one is likely to be better aware of the problem of bulk and complexity of horticultural literature than the reader of *H.A.*, except perhaps its harassed compilers. To illustrate the point take a look at abstract 1260, which gives a quite inadequate account of the annual report of horticultural research in the Netherlands for 1954; now published in book form the report runs to 439 pages. As a means of reducing bulk and complexity, an increasing number of review articles are being published. These reviews, however, generally cover restricted fields, and attempts to integrate knowledge gained in each of them to provide a more general picture are conspicuously absent. Such, at least, is the theme of the author of one of the general papers presented at the 14th International Horticultural Congress (3). In his view the time is ripe for adopting a broader approach in which all the aspects of plant growth are considered together and related one to another. Many of the papers abstracted in this and other numbers of *H.A.* pose problems that can only be solved satisfactorily by some such general approach. Consider the items which follow.

The problem of physiological age:—Differences in the time taken to start flowering between trees raised from a fruiting *Malus* hybrid and from its apomictic seedlings (968) may be evidence to support the theory that apple clones age physiologically, in a manner similar to that previously reported for citrus. Applied to cacao seedlings maleic hydrazide acts as an anti-mitotic, but applied to cacao cuttings it appears to have an anti-hormone effect (1114); the reason for the difference in response is not known, but again it might be a manifestation of age difference. By contrast, no age factor was apparent in the rooting behaviour of tea cuttings taken from successive generations of a single clone (1220).

The problem of growth phases:—Sudden increases in water consumption by apple and persimmon trees during the second half of the summer despite drought conditions (190) would appear to require examination in relation to the phase of growth of the trees. More clear-cut phasic variations in water requirements are demonstrated for grapefruit (1005) and olives (1052). In tung yield and biennial bearing behaviour have also been correlated with rainfall occurring 9-12 months earlier during the period of flower induction, but not with rainfall at other stages of growth (1064). Turning to nutrient uptake, two papers indicate phasic variations in hop plants (837, 840); in one case particularly rapid uptake was narrowed down to a 6-day period shortly before burring. Developing tomato plants show 3 thermophases (700), and during the maturation of tomato fruits there are short critical periods of perhaps only 3 to 4 days during which light has a pronounced effect on ascorbic acid content and colour (706, 707). Bean seeds also show phasic development (604).

The problem of different plant parts:—The mineral composition of citrus leaves has been found to vary in different parts of the crown, some elements being more abundant in one part and some in another (994). Citrus fruits also show within-tree variations (995). In tomatoes the upper and lower leaves respond differently to water stress (703, 704), and in pea plants the distribution pattern of radioactive phosphorus is highly specific (615). In grape vines leaf blades give a more satisfactory picture of nutrient status than do petioles in the case of 4 elements, but the reverse is true for 6 other elements (305).

The problem of different environments:—The anatomical structure of apple leaves varies with altitude (191) and that of tobacco leaves with light intensity (769). Leaf analyses suggest that grape vines have lower nutrient requirements in Morocco than in France (304). In radishes the potash requirement varies with both day-length and light intensity (674), and in spinach both day-length and temperature affect sex expression (687).

CULTURAL ASPECTS

Soil management:—Soil salinity risks to furrow-irrigated crops can be reduced by altering the shape of the seed bed (81). Evidence from vegetable rotation studies suggests that decomposing residues from some crops may, under certain conditions, produce a substance toxic to the succeeding crop (542). New or supplementary information on older themes concern soil moisture, temperature and nutrients as affected by soil conservation practices (84, 1146) and grass sod types and management (217, 218).

Planting tree crops:—For peaches small nursery stock appears to be better than large (175). Spacing tree and bush crops to form hedges has been under investigation for some time with crops such as rubber (1179) and tea (1223). Hedge planting and the complementary process of hedge pruning are now arousing the interest of some Californian citrus growers (986, 987).

DISEASE, PEST AND WEED CONTROL

Antibiotics:—Increasing interest is being shown in plants as possible sources of antimicrobial substances (848-850). Among many papers relating to the use of antibiotics against diseases mention may be made of a general review of the subject (328) and of a case in which the action of streptomycin appears to have been enhanced by the addition of copper (729). There is a record also of one bacterium attacking another, which was in turn attacking bean leaves (623).

Diseases:—The literature on the infection of plants by fungi is reviewed in one paper (363), and different methods of inducing or enhancing the resistance of plants in three others (371, 722, 723). The effects of pathogens on host-plant metabolism form the subject of one paper on fruit trees (213) and a comprehensive series on tobacco (775, 786-789). Virus diseases may be let off lightly with a reference to serological methods of identification (902) and to the disconcerting suggestion that xyloporosis and tristeza of citrus are one and the same thing (1010).

Pests:—Three papers may help to explain why insects attack and multiply on some plants and not on others (745, 1022, 1125). Having arrived there, their effect on fruit size and yield can be measured statistically (1014), or their action on plant tissues can be examined with the aid of radioisotopes (417, 433). Among studies on control attention may be drawn to attempts to eradicate phylloxera without destroying the host vines (411-414) and to a successful, if a trifle unsporting, method of reducing oriental fruit fly infestations by annihilating the males (1075). The development of DDT-resistance in insects is well known; now comes a beetle which has developed resistance to rotenone (630). Against birds a form of electric fencing is available (427).

Chemicals and their application:—New compounds or combinations of compounds include an acaricide (401), fungicides with and without insecticidal properties (429, 904), herbicides (491, 495) and soil fumigants used alone against weeds (515) and in combination with a chemical solution against nematodes (549); BHC also turns up in a new guise, this time as a nematocide applied around young peach trees (396). As regards application there are two portable power sprayers designed specially for use in the tropics (1074) and a variable dosage sprayer which can apply continuously decreasing concentrations (114). Comparisons are made between different methods of applying chemicals (489, 521, 546, 590) and the effects of repeated applications of insecticides to soil are reported (548). Finally there is always the possibility of misapplication, but, in case this does not occur to you before throwing CMU in your ornamental lake, take a glance at (463).

EQUIPMENT AND BUILDINGS

Apparatus and techniques:—Among relatively large items are an evapotranspirometer (115), a cover to assist the burning of brushwood on tobacco seedbeds (746) and a large revolving wheel for dipping sugar cane setts (1211). Laboratory apparatus includes a device for rapidly inoculating citrus fruits with mould spores (1038), and, noted by title only, a cabinet for aseptic manipulations (117m) and a leaf-sampling disc-cutter (117x). Three papers deal with the application of artificial light to plants, including different types of lamp (99-101), and other subjects discussed are the construction and use of gypsum soil-moisture meters (116) and of field bins for studies on vegetables (539).

Glasshouses and stores:—Attention is drawn to a series of papers on glasshouse construction and environment (103-110) and to three papers on cool or cold stores (247-249).

GROWTH AND PHYSIOLOGY

Vegetative growth:—In the apple top growth is affected by stem height (176), in the black currant, but not the apple, by photoperiod (194) and in the strawberry by root temperature (276). In citrus root growth is correlated with soil temperature (989) and root distribution with tree yield (990).

Flower formation and development:—The rootstock affects the time of flower formation in grafted pea and kalanchoe plants (607, 929). In strawberries low temperatures as well as short photoperiods may induce inflorescence initiation (277, 279), and in tobacco plants gamma rays may produce a similar response (768). Studies on the course of flower-bud development are also reported for pome fruits (183, 184, 186), sultana vines (294, 295) and bananas (1082, 1083).

Physiology:—Rather rich fare is provided in the sections on physiology and growth substances (39-68). In addition attention may be drawn to evidence that atmospheric electricity affects plant growth (24), studies on factors influencing water loss from tomato plants (702) and on photosynthesis in sugar cane as affected by soil moisture (1199), and indications that nectar secretion is an active process and not merely an exudation of phloem sap (969). The proliferation *in vitro* of pericarp tissue from a horticulturally mature fruit, an avocado, has been demonstrated for the first time (977). Additional papers on growth substances concern an inhibitor in dormant peach flower buds (185), the application of growth substances to reduce bolting in cabbages (560) and to keep turnips tender (676), and the interactions between applied growth substances and temperature and day-length in sugar cane (1198). Possibly in the growth-substance category is the transfer of the photoperiodic stimulus from one plant to the seeds of another when the latter have been implanted in petioles of the former (677).

HANDLING HORTICULTURAL PRODUCE

General:—New editions have appeared of the British Ministry's bulletin on apple grading and packing (227) and of Saanichton's leaflet on cutting and packing holly (960). Other general papers deal with points to look for in choosing a fruit grader (226), the physiology of packed fruit (228) and the handling of bananas for export (1086).

Transport:—Bulk-handling of citrus between orchard and packing house appears to be spreading (1026, 1027) and the method is now being tested for apples (224). After packing, too, a bulk-handling development is the binding of boxes in re-inforced stacks of a size convenient for fork-lifting (1029).

Containers:—New types of container are described for strawberries and raspberries (269) and for flowers (891), bananas (1087) and tropical fruits transported by air (1077, 1173). A development in the use of volume-fill cartons for oranges is a new automatic filling device (1028). Other papers include comparisons between containers used for peaches (225) and pineapples (1172) and a short account of the aims of a laboratory for studying containers recently opened in Paris (5).

Polythene packages:—Polythene or, if you prefer, polyethylene has been tested in the form of packages, wraps or box liners for apples (236), stone fruits (237) spinach (690), ornamental nursery stock (880, 881) and tea cuttings (1221). Although some of the results are excellent, there are many teething troubles to be overcome.

PLANT NUTRITION

Application and absorption:—Practical advances include the use of growth measurements to aid in determining fertilizer needs of rubber trees (1180) and a method of calculating what will happen to tea yields if you stop applying fertilizers (1225). The mass injection of tobacco stems with sugar solutions as a means of increasing the sugar content of the leaves seems to be imminent (751). Pot plants on greenhouse benches can be surrounded by peat, which is fed with a nutrient solution through perforated plastic hose, a method so simple that it is hard to believe that it is new to anyone except ourselves (112). Among research papers attention may be drawn to three concerned with source effects of N and P (214, 652, 1065) and one with the specificity of voltage potentials in cation uptake by plants (96). Biuret has previously been mentioned as a toxic impurity in urea; two papers now throw light on the amounts of biuret that may be safe under various conditions (712, 1000).

Plant composition and structure:—Included among the numerous papers on this subject is one on the mineral status of sugar cane at different growth stages as revealed by leaf analysis, which is notable for the range of elements covered (1203) a second giving data on elements leached from apple leaves by rain (210), and three others which throw light on the effects of deficiencies on the organic acid metabolism of plants (333, 616, 760). Finally two papers, both on tobacco, show the marked effects that nutrition may have on plant morphology and anatomy (759, 761).

Boron.—One article on B deficiency and excess forms the first chapter of a new book on the nutrition of citrus (1003). Others throw a little more light on the role of B in carbohydrate metabolism (675) and on Ca/B ratios (1205).

Iron.—Two papers may be mentioned on the behaviour of different chelating agents in plants and soil (90, 91). Two others suggest an interrelationship between Fe and N in pineapple nutrition (1164, 1165).

Manganese:—Now on the crest of a wave of popularity its sins of commission or omission figure prominently in seven papers (337, 338, 617, 666, 716, 717, 1004).

More exotic elements.—Those who find N P K, etc., rather mundane may wish to explore the possibilities of chromium (308), lead (783), nickel (718), rubidium (92-95) or selenium (1205).

PLANT PROPAGATION

Seed treatment:—Apple and pear seeds can be cut in half to produce twin plants for research purposes (148). Attempts to improve the performance of pelleted lettuce seeds have not been very successful (678), but with carrots the incorporation of an insecticide in the pellets appears to provide a good means of controlling carrot fly (667, 668). With peas seed-borne infections of *Ascochyta pisi* can be eliminated by soaking the seeds in an antibiotic (624) or, if you have the necessary patience, by storing them for 7 years (626). On the other hand biochemical changes during storage may lead to mutations (78). With tobacco seed treatment with silver nitrate against bacteria is under investigation (791). Soaking vegetable seeds in growth substance solutions may sometimes have a stimulating effect which is reflected in the ultimate yield of the crop, but the opposite effect seems equally probable (555). Finally, if your customers do not like discoloured sweet pepper seeds, you can bleach them with sodium hypochlorite, but caution is advisable (728).

Seed germination:—Knowledge on methods of embryo culture is advanced by papers on stone fruits (145-147) and on beans (602). In culturing vanilla seeds nitrogen is shown to have an inhibiting effect on germination (811). Among other papers are three on physiological and chemical changes occurring during germination (857, 916, 943), one on the effects of temperature on dormancy in apple seeds (144) and another on fungi associated with germination tests on grass seeds (925).

Seed production.—A recessive genetic marker has been used to aid the removal of non-hybrid plants in the production of commercial F_1 hybrid watermelon seed (587).

Cuttings:—Many aspects of propagation from cuttings were discussed at the 14th International Horticultural Congress (69-71, 73, 74, 76 and elsewhere). In addition, attention may be drawn to a method of inducing black pepper vines to produce aerial roots as a prelude to taking single-node cuttings (808), and to several new developments in technique and equipment, namely, a large-scale combination of mist propagation and nutriculture (871), a propagating frame with electrically heated water (872), and, for the amateur, a small mist propagation unit (75) and a polythene covered propagating box (959).

Transplanting:—Two papers on cacao (1100, 1101) deal respectively with the use of vinyl resin as an anti-transpirant and with the raising of seedlings in veneer tubes, which can be removed from the ground after the seedlings have been planted.

MISCELLANEOUS

Air pollution:—Papers from a new symposium (25, 26, 662) and other sources (118j, 1007, 1008).

Algae:—A large monograph on their culture, with animal, and we suspect human, fodder as the ultimate aim (861).

Ascorbic acid oxidation in orange juice:—Adding juice of the carambola reduces it (1232).

Crop forecasting:—Sampling survey methods applied to the Brazilian coffee crop (1143).

Flower colour chart:—A cheap adaptation of the Horticultural Colour Chart (9).

Making mutations:—Developments in the use of thermal neutrons and X-rays on fruit trees (130, 131).

Oil extraction:—Pectinase added to olive pulp as an aid to higher extraction rates (1056).

Thought for 1956:—*H.A.* was started because no one had time to read all original papers. Salient items was started because no one had time to read through *H.A.* Will those who have not had time to get so far as this please suggest the next move?

MISCELLANEOUS.

General.

(*See also* 117 l, t, 118a, 1241, 1243, 1244, 1246, 1260, 1264, 1266, 1267, 1270, 1273-1275, 1280, 1281, 1285a, c-e, g, h, l-n, q, t, w.)

1. Hudson, C. E.
Experimental horticulture stations in England.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The new stations established in recent years under the National Agricultural Advisory Service (N.A.A.S.).—Minist. Agric., London. [See also *H.A.*, 23: 1428.]

2. Cullinan, F. P.
Current trends in horticultural research in the United States.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The subjects discussed include progress in the matter of: growth substances, leaf analysis technique, radioactive chemicals, chromatography, light effects, breeding technique, the nematode danger.—U.S.D.A. Plant Industry Station, Beltsville, Md.

3. Tubbs, F. R.
The control of growth and reproduction in perennial plants.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The problems of adequate and continuing integration of the great mass of information already available within the literature of horticultural science, and rapidly increasing as the results of the great post-war expansion in applied and fundamental research become available, are discussed in relation to the phenomena of growth and reproduction in woody perennials, and some possible solutions are examined.

4. Chouard, P.
Le rôle des basses températures en horticulture. **(The function of cold in horticulture.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The function of cold is discussed under three headings: cold as the cause of death or stabilization, cold as a brake on life processes, cold the stimulator.—Sorbonne, Fac. Sci. Physiol. Vég., Paris.

5. Texte, H., and Verlot, J. B.
Étude et contrôle des emballages. **(Study and testing of containers.)**
Fruits d'Outre Mer, 1955, **10**: 380-3, illus.

Information is given on the objects and facilities of the General Laboratory of Containers due to open officially in Paris in November 1955.

6. Loosjes, T. P.
Centre for agricultural documentation in the Netherlands.
FATIS Rev., 1955, No. 3, pp. 72-3.

A brief account is given of the Dutch abstracting service, founded in 1951 and situated in the library of the Agricultural University at Wageningen.

7. Unesco.
List of Scientific papers published in the Middle East.
[*Publ.*] *Unesco Mid. East Sci. Coop. Off., Cairo*, 1955, pp. 130, being *List* **12**.

This list, which covers the period April/November 1954, is the last to be published by Unesco. The Scientific and Technical Documentation Centre of the Egyptian National Research Council, which has recently been established in Cairo with the assistance of Unesco, is starting the publication of a monthly bulletin which will include a special section intended to replace the "Lists".

8. ANON.
Annual agricultural and pastoral statistics: Australia.
Quart. Rev. agric. Econ., 1955, **8**: 148-52.

These include annual figures for 1948/49 to 1954/55 and an average for the 5 years ended 1938/39 for acreages, production, yields and exports of top and small fruits, vines, citrus, sugar and tobacco.

9. WANSCHER, J. H.
Simplified flower colour descriptions, and a new flower colour chart.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author describes the main features of a cheap 4-page colour chart which makes the information given in the Horticultural Colour Chart "more readily available to readers who do not possess the atlas". [See also *H.A.*, 23: 3704.]—Hort. Dep., roy. vet. agric. Coll., Copenhagen.

10. VAN NES, A. R.
Kostprijsberekeningen in de tuinbouw. **(Costings in horticulture.)**
Meded. Dir. Tuinb., 1955, **18**: 547-55.

The meaning of costs and how they are calculated is explained and the application of costing is then discussed. In horticulture with its varied products and dependence on foreign markets price control as applied in agriculture is neither desirable nor applicable, though it can be used to prevent excessive fall in prices. Costings may be used to determine trade policy; in the Benelux agreement a tax is levied on Dutch horticultural produce which is based on and compensatory for differences in costs between Belgium and Holland. Costings can show the returns which may be expected from investments, and they provide a basis for comparison of costs of a particular crop in different areas. At present in Holland the Agricultural Economics Institute is studying costs and yields in individual horticultural holdings. Much variation has been found, and a study of differences should reveal the effect of different factors, including mistakes, on the final cost of a crop.

Experimental technique.

(*See also* 118c, h, 601, 1096, 1251, 1285u.)

11. LAWRENCE, W. J. C.
Techniques for experiments with pot plants.
Plant and Soil, 1955, **6**:332-46, bibl. 10, illus.

The 3 major sources of error affecting the experimental behaviour of the plant in glasshouses are its genetics, the climate and experimental methods. The use of inbred or homogeneous material can reduce genetical errors; the selection of equal-sized seedlings can also give some uniformity. Light gradients can be reduced to some extent by east-west orientation. Regulated ventilation and careful positioning of heating pipes will help to reduce temperature gradients; a uniform air temperature may be maintained by means of a thermostat. Some of the variations in growth due to the handling of materials and plants may be reduced by using one man for the whole experiment, by the use of standardized composts and uniform pots, and by obtaining uniform soil compaction and watering. Techniques recommended for seed sowing, pricking out and potting are described.—John Innes hort. Instn, Bayfordbury, Herts.

12. SHARMA, R.
A technique of whole mounts for the study of floral anatomy.
Curr. Sci., 1955, **24**: 315-16, bibl. 4.

The technique consists of fixation followed by KOH treatment, staining with basic fuchsin and lactophenol treatment.—J.V. College, Baraut, Meerut.

13. ALVEY, N. G.
Error in glasshouse experiments.
Plant and Soil, 1955, **6**:347-59, bibl. 3.

The proportions of plot variances that are assigned to error in glasshouse experiments at Bayfordbury were examined to determine the number of replications required per treatment. The relationship between average percentage standard error and weight of tomatoes picked by the end of a week was examined. It was found that the estimation of an early crop could be most suitably discovered by using the cumulative weight of fruit picked by the end of the fourth week from the start of picking. The gradients apparent on glasshouse benches and in crop houses were studied so that they could be taken into account in experimental design. Randomized blocks are suitable for experiments with small pots and germinating seeds on the benches. Where practicable a Latin Square design would be most suitable for cropping experiments with tomatoes grown in beds, especially for an unequal-span house with east-west orientation.—John Innes hort. Instn, Bayfordbury, Herts.

14. ENGLUND, K. L.
Atomic energy in agriculture.
J. agric. Food Chem., 1955, **3**: 826-33, illus.

The author surveys work in the U.S.A. on the use of radioactive materials, in particular as isotopes, in agricultural research.

Breeding and genetics.

(*See also* 117o, u.)

15. WALKER, J. C.
Breeding for disease resistance.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author notes that the first successful result of breeding for disease resistance was the production of a wilt-resistant melon in about 1900. He then discusses:—differences in success achieved with different groups of pathogens; the usefulness of controlled conditions for assay of host resistance; and the necessity of coordinating breeding for resistance with breeding for other improved qualities in the crop.—Univ. Wis., Madison.

16. S'JACOB, J. C.
Infection methods for the determination of differences in susceptibility when breeding for disease-resistance in horticultural crops.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author lays down and discusses 5 requirements for an infection method. Further he insists that the infection material must be pure, i.e. not mixed with other parasites, the cultures must be definitely virulent, and all the physiological races of the parasite occurring in the country for which the new varieties are bred should be known. Three groups of infection methods are considered.—Inst. phytopath. Res., Wageningen.

Pollen and nectar.

(*See also* 1073.)

17. Faull, A. F.
Some factors in pollen germination: calcium salts, dextrose, drying.
J. Arnold Arbor., 1955, **36**: 171-88, bibl. 9.

Experiments on various members of the Iridaceae, Amaryllidaceae and Liliaceae to show the effects on pollen germination of Ca++, Sr++, Ba++, dextrose, other sugars and drying have been reviewed and discussed, both with respect to any practical application of the findings and to the evidence they present of factors and mechanisms involved in pollen germination. A possible mechanism in terms of wall conditioning through the control of hydration and plasticity by drying, Ca++ (mineral) and dextrose (sugar) is suggested. [Author's summary.]

18. Robert, E.
Essai de classification des plantes mellifères. **(An attempt to classify nectar-producing plants.)**
Rev. hort. Paris, 1955, **127**: 1328-30, illus.

The plants are listed by families with an indication of whether they are wild or cultivated. Distinctions are drawn between commonly cultivated plants producing much nectar, other plants producing much nectar and plants producing moderate amounts of nectar.

Climate and air pollution

(*See also* 118e, f, j, 342-353, 1007, 1008, 1248.)

19. Deering, R. B.
Horticulture and the improvement of hot-climate environments.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

With special attention to methods of combating the incidence of excessive heat and particularly to the protection afforded by ground cover, such as lucerne.—Univ. Calif., Davis.

20. Napier, C. L.
Shelter for horticultural crops in Hawkes Bay.
N.Z. J. Agric, 1955, **91**: 297-303, bibl. 3, illus.

The author discusses reasons for shelter, types of hedges, and their propagation and maintenance.

21. van Wijk, W. R., and Hidding, A. P.
Onderzoek over de verandering van het klimaat achter windschermen. **(Research on climatic changes behind windbreaks.)** [English summary 9 lines.]
Landbouwk. Tijdschr., 1955, **67**: 707-12, bibl. 14.

The average temperature increase behind a windbreak, at a distance from it of 30-50 times its height, is 1° C. or less; this effect is easily masked by yearly climatic differences, and differences in available water or in plant health. When the width of the sheltered area is not more than about 10 times the height of the shelter the increase in average daily temperature behind the shelter becomes about 2° C. Further experimental work on the influence of windbreaks on crop yield seems only to be justified if close spacing of the shelters is considered to be economical.—Lab. Natuur-Weerkunde, Wageningen.

22. Fuss, F.
Spätfrost und Spätfrostvorhersage. **(Late frosts and their forecasting.)**
Arch. Gartenb., 1955, **3**: 65-72, bibl. 24.

For central European conditions the most useful forecasting methods based on 14-hour observations appear to be the dew-point method combined with relative humidity determination, the method of equivalent temperature and the Faust-Thran rule.

23. Gloyne, R. W.
Some effects of shelter-belts and wind-breaks.
Met. Mag., 1955, **84**: 272-8, bibl. 47.

The effects of a barrier on wind speed, soil and air temperature, humidity, evaporation, soil moisture and erosion are discussed. Shelter belts may give rise to the following effects: increased yield; earlier crops; better quality produce; alteration of pest and predator balance (not always advantageously); protection of fruit trees from cold winds at blossoming time; reduced risk of windfalls; the possible creation of a damp stagnant atmosphere. Some notes on the effects of certain types of natural barriers are also given.

24. Kičigin, A. A.
The effect of atmospheric electricity on the growth and development of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **103**: 513-15, bibl. 6.

Barley and broad bean plants shielded from atmospheric electricity by a wire mesh produced longer shoots than the controls. The weight of dry matter, however, was in both cases the same and the control plants produced more flowers a little earlier, indicating that atmospheric electricity had a slight accelerating effect on development.

25. Middleton, J. T., Kendrick, J. B., Jr., and Darley, E. F.
Air-borne oxidants as plant-damaging agents.
Proc. 3rd nat. Air Pollution Symposium, Pasadena, 1955, pp. 191-8, bibl. 14, illus.

Fumigations with ozonated hydrocarbons showed that pinto bean was the most susceptible to damage of the 8 plants tested. Bean plants were fumigated with hydrocarbons, ozone, reaction products of ozonated hydrocarbons, and reaction products with residual surplus ozone. The hydrocarbon vapours did not have any visible plant-damaging effect, ozone produced bleaching of the upper leaf surface, and toxicants resulting from ozonated olefin produced glazing and bronzing of the lower leaf surface. The response of the pinto bean leaf to both ozone and reaction products from ozone and hydrocarbon makes this plant useful for detecting the presence of these oxidants and for distinguishing between them. A plant damage survey in the Los Angeles area with young pinto bean plants indicated a positive correlation between the injury index (the sum of degree of leaf damage observed after 24 or 48 hours' exposure, divided by the number of leaves sampled) and the daily oxidant average. The correlation was only significant at 2 out of 5 survey stations.—Dep. Plant Path., Univ. Calif., Riverside.

26. BENEDICT, H. M., AND BREEN, W. H.
The use of weeds as a means of evaluating vegetation damage caused by air pollution.
Proc. 3rd nat. Air Pollution Symposium, Pasadena, 1955, pp. 177-90, bibl. 5, illus.

Ten weed species, commonly occurring in the United States, were used as indicators of damage caused by ammonia, chlorine, hydrogen fluoride, hydrogen sulphide oxides of nitrogen and sulphur dioxide. Fumigation was carried out for 4 hours, under conditions of open stomata, with plants of 2 ages, under 2 conditions of soil moisture stress, and with 2 concentrations of pollutant. Results are recorded on the damage caused (with descriptions and coloured photographs of the markings produced on each weed by each fumigant) and on the relative resistance of the weeds to each fumigant. By using both sources of information it is hoped that the cause and extent of air pollution causing markings on vegetation may be determined. —Stanford Res. Inst.

Biochemistry.

(*See also* 117e, h, p, r, 118b, 259, 780, 781, 1285k.)

27. ZIMMERMANN, M. H.
Microextraction for paper chromatography.
Science, 1955, **122**: 766, illus.

An apparatus used to extract sugars with pyridine from 30-mg. (fresh weight) samples of plant tissue is described.—Harvard Univ., Mass.

28. BAUSERMAN, H. M., AND OLSON, R. F.
Analyses of plant materials using EDTA salts as solubilizers.
J. agric. Food Chem., 1955, **3**: 942-6, bibl. 24.

In a rapid method that avoids ashing, a solution of EDTA salts successfully extracted all the calcium from ground or pulped cabbage leaves, rhubarb petioles, apple fruits and carrot roots. The resultant extract was then analysed by gravimetric, flame spectrophotometric, polaroscopic and chromatographic methods.—Amer. Crystal Sugar Co., Rocky Ford, Colo.

29. RADHAKRISHNAN, A. N., VAIDYANATHAN, C. S., AND GIRI, K. V.
Nitrogenous constituents of plants. I. Free amino acids in leaves and leguminous seeds.
J. Indian Inst. Sci., Sects A and B, 1955, **37**: 178-94, bibl. 43, illus.

A survey was made of the free amino acids in the leaves of *Citrus* spp., *Atriplex hortensis*, *Amaranthus gangeticus*, *Murraya koenigii*, *Coriandrum sativum*, *Piper betel* and *Mentha piperita*. Large quantities of free proline are present in the leaves of the citrus group. The majority of leaves are comparatively rich in asparagine, glycine, aspartic acid, glutamic acid and alanine although they are deficient in some of the essential amino acids. An analysis of the amino acids of leguminous seeds, with particular reference to *Phaseolus radiatus*, was also carried out.

30. NELSON, C. D., AND KROTKOV, G.
Metabolism of C^{14}-amino acids in detached leaves of *Vicia faba*.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxvii.

Detached broad bean leaves were placed on 0·01 M. ammonium nitrate and allowed to photosynthesize in $C^{14}O_2$ for periods varying from 2 minutes to 2 hours. The specific activities of the amino acids were then determined.—Dep. Biol., Queen's Univ., Kingston, Ontario.

31. DRUMM, K.
Vergleichende Untersuchung über Etiolement und Pigmentgehalt an chlorophylldefekten und normalen Sprossen von *Tradescantia albiflora* var. *albovittata*. **(Comparative research on etiolation and pigment content in chlorophyll deficient and normal shoots of *Tradescantia albiflora* var. *albovittata*.)**
Planta, 1955, **46**: 92-112, bibl. 35.

Both normal and chlorophyll-deficient shoots of *Tradescantia albiflora* var. *albovittata* became etiolated under low light intensities. Blue and orange spectral regions strongly inhibited excessive internode elongation, but favoured leaf differentiation. Chlorophyll-deficient shoots contained the same 5 carotenoids as normal plants, but the total carotenoid content was only 10% of that in normal plants.—Bot. Inst., Univ. Tübingen.

32. SPIKES, J. D., LUMRY, R., AND FUJII, F.
Spectral properties of a reported crystalline chlorophyll-lipoprotein as isolated from plants of different species.
Proc. Utah Acad. Sci., 1953-1954, **31**: 106-8, bibl. 4.

Crystalline substances isolated from several plant species and showing approximately the same absorption spectrum were thought to contain chlorophyll, protein and lipid. The plants used included iris, beet, kale, snapdragon, zinnia, maple, geranium, tomato, lettuce and sunflower.

33. MOLOTKOVSKIĬ, G. H., AND MOLOTKOVSKIĬ, JU G.
The distribution of ascorbic acid in the axial organs of normally and horizontally growing plants of milkweed [*Asclepias cornuti*] and walnut [*Juglans regia*]. [Russian.]
Doklady Akad. Nauk, S.S.S.R., 1955, **103**: 921-4, bibl. 9, illus.

The basic pattern of vitamin C distribution was the same in the stems grown horizontally as in those grown upright in both plants.

34. BROWN, T. E., AND EYSTER, H. C.
Carbonic anhydrase in certain species of plants.
Ohio J. Sci., 1955, **55**: 257-62, bibl. 19.

Carbonic anhydrase was found in macerates of 10 plant species (*Ipomoea purpurea*, *Amaranthus retroflexus*, *Liriodendron tulipifera*, *Maclura pomifera*, *Verbascum thapsus*, *Zea mays*, *Plantago rugelii*, *Portulaca oleracea* and 2 algae) which have not previously been examined for the presence of the enzyme. A decrease in carbonic anhydrase activity of leaves was found to accompany the decomposition of chlorophyll associated with autumnal leaf coloration in *Liriodendron*. Activity was observed in macerates of genetically green and albino maize seedlings grown in light, but no activity was observed in those grown in darkness. There was little relationship between pigmentation and level of carbonic anhydrase activity in extracts of 9 varieties of maize. The levels of carbonic anhydrase activity were a varietal characteristic. An increase in activity of about 150% was noted in "low activity" plants when 0·01 M. cysteine was used as the maceration medium.—Charles F. Kettering Foundation, Yellow Springs, Ohio.

35. FORTINI, S.
Effetto della luce e della concentrazione in CO_2 sull'attività di alcuni sistemi enzimatici di tessuti fogliari. **(Effect of light and carbon dioxide concentration on the activity of some enzymes in leaf tissues.)** [English summary 1 p.]
Ann. Sper. agrar., 1955, **9**: 1175-95, bibl. 8.

The activities of catalase, peroxidase, carbohydrase and catechol oxidase and the oxidation of ascorbic acid were studied in whole and half leaves of *Vicia faba*, *Pisum sativum* and *Cynara scolymus* in light, in darkness and in atmospheres with high and low concentrations of CO_2. Catalase and peroxidase activities were unaffected by the treatments. Light plus high CO_2 significantly increased carbohydrase activity but variations in the CO_2 supply alone had no effect. Light noticeably accelerated the catalytic oxidation of catechol. Light had no effect on the oxidation of ascorbic acid in *Pisum sativum*.—Staz. chim.-agrar. sper., Roma.

36. BONNER, W. D.
Phenol oxidase reduction of cytochrome c.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxx.

The oxidative capacities of mitochondria from mushroom (*Psalliota campestris*) and mung bean seedlings (*Phaseolus aureus*) have been investigated in detail. Observations indicate that phenol oxidase could function anaerobically in respiration. It is suggested that the enzyme reacts directly with O_2 only under conditions of high O_2 tension. Under normal conditions it acts in an electron transport system using cytochrome c. as an acceptor.—N.Y. St. Coll. Agric., Ithaca.

37. SMILLIE, R. M.
Enzymic activity of particles isolated from various tissues of the pea plant.
Aust. J. biol. Sci., 1955, **8**: 186-95, bibl. 23.

A method is described for the preparation, from green and etiolated tissues of the pea plant, of cytoplasmic particles with high oxidative activities in the presence of intermediates of the tricarboxylic acid cycle. The co-factor requirements have been investigated, and for preparations from etiolated pea stems a phosphorylative ability comparable with animal mitochrondria has been obtained. With certain of these preparations an oxidation of butyrate has been demonstrated. [Author's summary.]—Dep. Biochem., Univ. Sydney.

38. BALL, E., MILLER, G. W., AND EVANS, H. J.
Hexokinase activity in a callus culture of *Vinca rosea*.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): v.

The crown-gall callus of *Vinca rosea* was grown on hexose or sucrose, with mineral salts in agar. After 6 weeks extracts were tested for their hexokinase activity. Callus extracts from all media possessed enzyme systems which converted glucose to glucose phosphate, and galactose to galactose phosphate. These observations indicate that the enzymes are naturally present in the callus tissue and do not arise in response to the presence of a specific sugar in the medium.—N. Carolina St. Coll.

Physiology.

(*See also* 117f, g, 118i, 194.)

39. KONOVALOV, I. N., AND MIHALEVA, E. N.
The use of labelled carbon (C^{14}) in studying the physiological adaptation of plants to their environment. [Russian.]
Bot. Žurnal, 1955, **40**: 411-14, bibl. 11.

Diurnal and seasonal changes in the photosynthetic activity of 5-year old walnut seedlings of different geographical origin were studied, with the aid of C^{14}, in and around Leningrad. A close connection was found between the intensity of photosynthesis and the geographic origin of the plants. Those raised from seed obtained from places with a severe climate were characterized by an increased photosynthetic activity and reduced sensitivity to fluctuations in the environmental conditions.

40. BROWN, F. A., JR., FREELAND, R. O., AND RALPH, C. L.
Persistent rhythms of O_2-consumption in potatoes, carrots and the seaweed, *Fucus*.
Plant Physiol., 1955, **30**: 280-92, bibl. 24.

The oxygen consumption of carrot sections was measured continuously over a lunar month (29 days) under constant conditions. The mean daily rate of respiration exhibited a minimum about the time of full moon and maxima at about third quarter and new moon. At about the time of the new moon maximum, minimum rates were shown for the 5-7 p.m. period. The average daily pattern for the 29-day period with carrot showed a conspicuous maximum at 4-5 a.m., and a minimum just after noon. The mean daily rate and form of the daily variation for a 15-day period straddling full moon differed from that straddling new moon. Carrot was found to possess a persistent primary lunar cycle of O_2-consumption, showing a primary minimum 1-3 hours before lunar zenith, and a lesser minimum 1-3 hours before lunar nadir. A significant correlation was found between hourly rates of respiration and the concurrent rate of change in barometric pressure. The respiration of carrot was decreased by both rises and falls in barometric pressure, decreasing about 7-8% for each 0·01 in. Hg/hour rise, and about 3% for each 0·01 in. Hg/hour fall. The significance of these results is discussed.—Northwestern Univ., Evanston, Ill.

41. Robertson, R. N., and others.
Studies in the metabolism of plant cells. X. Respiratory activity and ionic relations of plant mitochondria.
Aust. J. biol. Sci., 1955, **8**: 164-85, bibl. 37.

The respiratory activity and ionic balance of mitochondria isolated from carrot and beet tissues by differential centrifugation have been studied. The oxygen uptake of the mitochondria with different substrates was investigated. The mitochrondria hold both cations and anions in concentrations greater than those in the supernatant. Experiments on the time of adjustment to a changed concentration of chloride in the supernatant solution have been used to calculate the diffusion constant of salt in the particle. On the assumption that most of the resistance to diffusion is in the surface membrane (thickness about 200 Å), the apparent diffusion constant of chloride in the membrane was shown to be of the order of 10^{-13} cm^2/sec. This agrees with that found for heart muscle sarcosomes under similar conditions and is of the order expected in a lipo-protein membrane. The concentrations of mobile cations ($Na+$ and $K+$) in the mitochondria are considerably greater than those in the supernatant. It is suggested that the internal concentrations are largely due to a Donnan equilibrium based on the immobile anions of the particle. Since no simple Donnan equilibrium will account for the simultaneous concentration of both mobile cations and mobile anions, it is suggested that the mobile anions might be accumulated by an accumulatory mechanism. The anion concentration difference between the inside and outside of the particles is of the order of magnitude to be expected if the electron carrier of respiration were acting as the anion carrier of accumulation. The results are therefore not inconsistent with the earlier hypotheses for the interdependence of the two processes. The results support the hypothesis that mitochondria are probably involved in electrolyte accumulation in plant cells and in secretion in animal cells such as those of the gastric mucosa. [Authors' summary.]—Div. Food Pres., C.S.I.R.O., and Bot. School, Univ. Sydney.

42. Fukaki, S., and Ogihara, R.
Investigations on the branching of plants. I. The relationship of branching with specific gravity. II. The influence of light intensity and soil texture on branching. III. Characteristics of axillary bud growth in *Cosmos bipinnatus* L. [Japanese, with English summaries ½, ⅓ and ⅓ p.]
Tech. Bull. Kagawa agric. Coll., 1953, **4**: 175-9, bibl. 9, and 1954, **6**: 151-60 (Parts II and III), bibl. 7.

I. The specific gravity investigations were made on 11 woody species including *Prunus persica*, *P. subhirtella*, *Spiraea*, *Morus* and *Euonymus* and 14 herbaceous species including tomato, bean, mint, ramie, chrysanthemum and aster. The results showed that: (1) the sp. gr. of the main stem is less than that of the branches. (2) The sp. gr. of the stem is greatest in the upper and least in the lower part. (3) In a given plant the sp. gr. of thick stems exceeds that of thin stems. (4) The sp. gr. of a stem with longer branches exceeds that of a stem with shorter branches. (5) The larger a seedling is, the greater is its sp. gr. (6) If a stem is topped and 2-3 apical buds are allowed to grow out, the branches so formed have a greater sp. gr. than the removed stem tip.
II. The branching linear density (total branch length/stem length) was investigated in a number of the plants used in the sp. gr. studies. The results showed that (1) With decreasing light intensity total stem length increases in relation to total branch length, whereas the branching linear density and the dry matter weight of the stem and branches decline. (2) Of various soil textures tested a 3:1 sand:clay ratio gave the highest branching density.
III. The chief conclusions drawn from the investigations on *Cosmos* were: (1) Before flower bud differentiation shooting is most vigorous at the basal nodes, opposite buds show unequal vigour and the more vigorous buds are spirally arranged on the stem. (2) After flower-bud differentiation shooting is most vigorous at the apical nodes and opposite buds show equal vigour.

43. Norris, W. E., Jr.
The effect of carbon monoxide on the respiration of root tips.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): ii.

An atmosphere of 5% oxygen: 95% carbon monoxide caused inhibition of oxygen uptake by the apical 5 mm. of excised onion root. Added glucose did not stimulate oxygen consumption by freshly excised root tips, but did stimulate respiration in roots starved for 15 hours following excision. There were indications of the presence of cytochrome oxidase in the root tip.

44. Stålfelt, M. G.
The stomata as a hydrophotic regulator of the water deficit of the plant.
Physiol. Plant., 1955, **8**: 572-93, bibl. 44.

The relationship between the movement of guard cells and variations in osmotic pressure as well as the effect of a water deficit of the leaf on these two phenomena to be studied in *Vicia faba*, *Rumex acetosa* and *Rheum rhaponticum*.—Univ. of Stockholm.

45. Junges, W.
Die "relative Transpiration" der Tomatenpflanze und ihrer Teile im Verlaufe der Entwicklung. **(The "relative transpiration" of the tomato plant and individual portions of it during the course of development.)**
Arch. Gartenb., 1955, **3**: 126-32, bibl. 13.

Relative transpiration is defined as the absolute transpiration within a period of 30 minutes, expressed as a percentage of green weight. An experiment was carried out to determine whether individual plant-parts could be used instead of whole plants to determine relative transpiration, used in Arland's wilting method of assessing plant vigour [see *H.A.*, 24: 3373]. Tomatoes were used as test plants, and were observed during the period between sowing and the beginning of fruit formation. On the whole, relative transpiration of the entire plant and of its parts decreased with increasing age. Tomato plants at the 4- or 5-leaf stage were at the most suitable stage for testing. It was shown that individual leaves could be used to estimate the relative transpiration of the whole plant.—Inst. Gartenb., Dresden-Pillnitz.

46. ROSENE, H. F., AND JONES, J. K.
Effects of antibiotics on water transport and growth in root tissues.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xvii.

Measurements were made of the effects of potassium penicillin G and streptomycin sulphate on water transport in excised onion roots. Water transport was stimulated at lower concentrations and depressed at higher concentrations of each antibiotic. Continuous exposure of the roots to dilute solutions of either antibiotic reduced the rate of elongation. Elongation inhibition for short exposure periods was later followed by acceleratory efforts. Tumour formation was induced at the higher concentrations.—Dep. Zoology, Univ. Texas, Austin.

47. GRAY, R. A.
The downward translocation of antibiotics in plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): vi.

Spray applications of streptothricin and pleocidin were readily absorbed by leaves of tobacco, tomato and bean plants. They were transported from intermediate treated leaves up to young leaves, down to older leaves, and in some cases to the roots. Streptothricin sprays applied to primary leaves of pinto bean plants protected the young trifoliate leaves from *Xanthomonas phaseoli*. Both antibiotics caused necrotic spotting of leaves. Streptomycin, dihydrostreptomycin, neomycin, oxamycin, bacitracin, and actinomycin were not translocated when applied as sprays. When a leaf was immersed in an aqueous solution of an antibiotic the following were transported from the treated leaf to younger leaves in tobacco: penicillin, streptomycin, neomycin, antibiotic 631, vimycin, streptothricin, pleocidin, and antibiotic 896. The last three compounds were also transported downwards from the treated leaves. Antibiotics which were not translocated in any appreciable amounts were oxytetracycline, chlorotetracycline, chloromycetin, oxamycin, dihydrostreptomycin, bacitracin, actinomycin and gramicidin S.—Merk and Co., Inc., Rahway, N. Jersey.

48. SWETS, W. A., AND ADDICOTT, F. T.
Experiments on the physiology of defoliation.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 291-5, bibl. 6.

The physiology of defoliation was investigated using beans in the greenhouse. Swabbing leaves with NH_4SCN, disodium 3,6-endoxohexahydrophthalate, phenyl mercuric acetate, or dichloroanisole accelerated abscission and injured the leaves, each compound producing a characteristic pattern of injury. NH_4SCN applied to primary leaves was translocated, producing injury and abscission of trifoliate leaves. IAA (indoleacetic acid) retarded leaf abscission when applied in a variety of ways; however, IAA accelerated abscission of the blade pulvinus when applied to the stalk of a debladed leaf. Applications of defoliants to the upper or lower surfaces of leaves were equally effective in accelerating abscission. Application to the upper surface of the mid-vein was as effective in accelerating abscission as application to the entire upper surface of the blade. Severing the main veins near the base of the blade retarded response to defoliants; removal of mesophyll in the same area did not retard response to defoliants. Removal of 75% of the leaf blade did not affect abscission, but removal of 90% of the blade accelerated abscission by 4 days. The auxin concentration of the leaf blade fell rapidly after application of a defoliant. [Authors' summary.]—Univ. Calif., Los Angeles.

49. JACOBS, W. P.
Studies on abscission: the physiological basis of the abscission-speeding effect of intact leaves.
Amer. J. Bot., 1955, **42**: 594-603, bibl. 28.

The abscission-speeding effect resulting in *Coleus* from the presence of intact, unfolded leaves is elucidated. There is no evidence for an "auxin-ethylene balance"; once shading was eliminated as an abscission-speeding factor, there was no detectable effect from leaves not actually attached to the test plants. Evidence is presented that the whole effect of the unfolded leaves along 2 sides of the stem is indirect: these leaves provide some material (as yet unknown) for the growth of the young leaves in the apical bud. These apical-bud leaves, in turn, produce diffusible auxin which moves basipetally and speeds abscission of debladed petioles below. The speed with which abscission results from different deblading patterns has been quantitatively related to the speed with which the bud leaves reach the size at which maximum auxin-production occurs. IAA substituted for leaf blades very slightly accelerated the abscission of debladed petioles above, when there was direct vascular connection. The general conclusion is drawn that an "auxin-auxin balance" controls leaf abscission in *Coleus* and probably controls the abscission of leaves, flowers and fruits of other plants. [From author's summary.]—Biol. Dept., Princeton Univ., N.J.

50. BIGGS, R. H., AND LEOPOLD, A. C.
The induction of abscission with auxins and defoliating agents.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): v.

In experiments with bean plants it was shown that quantitative influences of auxin on abscission changed markedly with leaf age. Abscission induction by proximal applications of auxin was most effective on newly-expanded leaves; distal treatments were most effective for induction at a later age. The presence of the leaf blade much reduced the auxin induction effect. With each chemical defoliant tested the maximum effect was obtained at about 10^{-13} M.—Dept. Hort., Purdue Univ., Indiana.

Growth substances.

(*See also* 48, 50, 117q, w, z, 193, 197-205, 301-303, 317, 318, Weeds and weed control section, 559, 560, 651, 676, 727, 802n, 836, 905, 967, 968, 985, 1114, 1166-1169, 1206, 1261.)

51. FAWCETT, C. H., WAIN, R. L., AND WIGHTMAN, F.
Studies on plant growth-regulating substances. VIII. The growth-promoting activity of certain aryloxy- and arylthioalkanecarboxylic acids.
Ann. appl. Biol., 1955, **43**: 342-54, bibl. 25, illus.

Fifteen series of aryloxyacetic, α-aryloxy-propionic,

-butyric and -*iso*butyric acids and the corresponding arylthio-analogues have been synthesized and their growth-regulating activity has been assessed in the tomato-leaf epinasty, wheat cylinder and the pea curvature tests. It is shown that in general arylthio-derivatives are less active than their aryloxy-analogues. Although for a cell elongation response the presence in the molecule of an α-hydrogen atom is usually necessary, three exceptions to this generalization have now been found. A lower activity in the 3:5-dichloro- compared with the 2:6-dichloro-compounds has been demonstrated. Evidence is presented to show that an ortho hydrogen atom in the nucleus is not an essential requirement for cell elongating activity as is postulated by other workers. [Authors' abstract].—Wye Coll.

52. van der Kerk, G. J. M., and others.
A new type of plant growth-regulating substances.
Nature, 1955, **176**:308-10, bibl. 4, illus.

In systematic studies of the dithiocarbamates the compound S-(carboxymethyl)-dimethyldithiocarbamate showed distinct growth-regulating activity when applied to tomato, cucumber, bean and pea plants. In the Went pea test the activity of the compound was 1% and in the *Avena* cylinder and sunflower stem tests it was about 5% of that of 3-indole-3 acetic acid. The relationship between chemical structure and growth-regulating activity of the above-mentioned compound and other dithiocarbamate derivatives is discussed.

53. Plaisted, P. H.
The effect of α-cyano-β-(dichlorophenyl) acrylic acid on plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): vi.

Aqueous solutions or suspensions of α-cyano-β-(2,4-dichlorophenyl) acrylic acid and 54 of its analogues were sprayed on small intact Bonny Best tomato plants and the growth inhibitory effect was studied. Tomato plants treated with α-cyano-β-(2,4-dichlorophenyl) acrylic acid showed a marked suppression of internode growth and leaf size. Growth was suppressed more quckly than by maleic acid, but the effect wore off more rapidly. Dormant leaf buds of red maple, apple and other woody plants treated with α-cyano-β-(2,4-dichlorophenyl) acrylic acid were delayed about 2 weeks in the spring but no morphological leaf abnormalities were observed.—Boyce Thompson Inst., N.Y.

54. Norman, A. G.
Some effects of pyridinethione on the growth of higher plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): vii.

Low concentrations of pyridinethione (2- pyridinethiol-1-oxide) inhibited root elongation and dry matter increase in cucumber and barley. Applications to the tops of several plants at equal or higher concentrations produced no obvious responses in growth and development.—Univ. Michigan, Ann. Arbor.

55. Shantz, E. M., and Steward, F. C.
The general nature of some nitrogen free growth promoting substances from *Aesculus* and *Cocos*.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxv.

Extracts of liquid and solid endosperm of immature *Aesculus* fruits possess marked growth-stimulating properties for explants of carrot root. One substance, of the range causing this activity, has been isolated and shown to belong to the leucoanthocyanin class, occurring naturally as a mono-glucoside. A concentration of 20 p.p.m. of this isolate in the tissue culture medium showed growth promoting ability similar to that of whole coconut milk at 10% concentration. The same or similar substances occur in coconut milk.—Dep. Botany, Cornell Univ., Ithaca.

56. Hay, J. R.
Experiments on the mechanism for the translocation of 2,4-D.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): v-vi.

Direct measurement of the amounts of 2,4-D transported confirmed that 2,4-D was not translocated from leaves of bean seedlings kept in the dark for 18-24 hours before and during application. Movement of 2,4-D from these leaves was induced by supplying carbohydrates to treated leaves, but such transport was reduced by lowered temperatures. The mechanism was inhibited by phytotoxic concentrations of auxin.—Harvard Univ., Mass.

57. Jaworski, E. G., Fang, S. C., and Freed, V. H.
Studies in plant metabolism. V. The metabolism of radioactive 2, 4-D in etiolated bean plants.
Plant Physiol., 1955, **30**: 272-5, bibl. 11.

In a study of translocation and metabolism of C^{14}-labelled 2,4-D by etiolated bean plants, it was found that 2,4-D was absorbed by the leaves. The movement of the 2,4-D molecule or complex from leaf to stem in etiolated plants was induced by leaf applications of sugar solutions. Under identical conditions no significant difference was observed in the rate of formation of the 2,4-D complex in the leaves of etiolated and normal bean plants.—Oregon St. Coll., Corvallis.

58. Michel, B. E.
Growth responses of cabbage and radish hypocotyl sections to indoleacetic acid and indoleaceto-nitrile.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xi.

Both cabbage and radish hypocotyls showed maximum response to IAA at 10^{-6} M and to IAN at 1 to 3×10^{-5} M. The maximum response of cabbage hypocotyl sections to IAA is greater than that to IAN; the reverse is true for radish.—State Univ. of Iowa, Iowa City.

59. Hitchcock, A. E., Sanford, W. W., and Zimmerman, P. W.
Chromatographic determination of indole compounds in ethanolic extracts of tomato seedlings treated with indole-3-acetic acid.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xi.

The relative amounts of indole-3-acetic acid (IAA) and indole-3-pyruvic acid (IPA) in extracts from IAA-treated tomato seedlings were estimated by paper chromatography. In the 4-day period after treatment IPA increased to a maximum, and then decreased to approximately the same as in controls; IAA decreased to an undetectable level. The amount of both compounds extracted was proportional to the amount of IAA applied, but distribution between stems and leaves varied according to the method of treatment. Increase in IPA was up to 400% or more of the amount extracted from controls, but this was not so with IAA.—Boyce Thompson Inst. N.Y.

60. Andreae, W. A., and Good, N. E.
The metabolism of indoleacetic acid by plant tissues.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xii.

The uptake and metabolism of IAA was studied in 12 species representing 7 families. In pea tissue 10-20% of the IAA taken up was accounted for in colour tests. Indoleacetylaspartic acid was the most abundant derivative found in peas, but little was found in other plants. There was considerable variation in the distribution of other IAA-derived compounds among the species studied.—Science Service Lab., London, Ontario.

61. Manning, D. T., and Galston, A. W.
On the nature of the enzymatically catalyzed oxidation products of indoleacetic acid.
Plant Physiol., 1955, **30**: 225-31, bibl. 21.

In the presence of pea seedling IAA-oxidase IAA undergoes oxidative conversion into at least 2 and probably 3 products. Colour reactions indicate that the 2 most prominent products contain aromatic amino groups and phenolic hydroxyl groups.—Calif. Inst. Tech., Pasadena.

62. de Ropp, R. S., and Markley, E.
The correlation of different aspects of auxin action.
Plant Physiol., 1955, **30**: 210-14, bibl. 13, illus.

The response of sterile segments of sunflower hypocotyl cultured on nutrient agar to IAA were studied. Stem elongation took place only when the auxin was applied to the apical end of the apical 5 mm. of the hypocotyl. Elongation was maximal at concentrations of 0·1 to 0·01 µg./ml. IAA. Maximum increase in fresh weight of the apical fragments took place at between 1 and 10 µg./ml. IAA. Root initiation was greatest at 0·1 µg./ml. IAA. It was concluded that the growth-promoting activity of IAA reached a peak at between 1 and 10 µg/ml., while its maximum auxin activity occurred between 0·01 and 0·1 µg./ml.—Amer. Cyanamid Co., Pearl River, N.Y.

63. Lund, H. A.
The biosynthesis of growth hormones in the pistils of flowers preliminary to the setting of fruit.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xiii.

In the style of *Nicotiana tabacum* the hormone content of the apical half increased shortly after pollination and then decreased, while that of the basal half increased slightly after pollination and hormone continued to be synthesized for a considerable time. Hormone synthesis in the ovaries was detected 2 days after pollination. These changes in hormone concentration were correlated with pollen tube position. Indoleacetic acid was identified as the growth hormone which increased in styles and ovaries after pollination. Tryptophan concentration in the style decreased immediately after pollinating, but increases were noted in the ovaries 2 days after pollinating. It was apparent that pollen tubes supplied enzymes, capable of oxidizing tryptophan to IAA, to the style and ovary. With the growth of pollen tubes towards the ovary, hormone synthesis was observed in the styles. Increased IAA synthesis then initiated ovary enlargement.—Dep. Botany, Univ. Michigan, Ann Arbor.

64. Almeida, C. R. Marques de.
Acerca do transporte polar das auxinas. II. Da estase do transporte e das formações neoplásicas. (**The polar transport of auxins. II. The blockage of transport and the redifferentiation of tissues.**) [English summary 1½ pp.]
Navarro, A. F., and Almeida, C. R. Marques de.
Idem III. Da ocorrência e da persistência do carácter juvenil. (**Idem III. The occurrence and persistence of the juvenile character.**) [English summary 2 pp.]
An. Inst. sup. Agron. Lisboa, 1952/53, **19**: 25-34, bibl. 2, illus., and 35-44, bibl. 5, illus.

The behaviour was studied of stem and root cuttings of several woody species when maintained in a moisture-saturated atmosphere in the light. Granulomes (or tumours or neoplasias) formed along the cuttings in a manner interpreted as resulting from the blockage of basipetal auxin movement. Morphology and histology of the tumours varied according to species, but was constant within species. The duration of "hydric stasis" determined the extent of the reaction, if too persistent leading to the death of the cuttings. Leaves produced from the buds during the formation of tumours differed from normal leaves, and this is considered to be a juvenility effect. After root formation by the cutting, the leaves produced were normal. The existence of a morphogenetic principle with an auxin-regulating mechanism is postulated, the persistence of auxin unbalance creating an internal lethal condition. No direct evidence for such a hypothesis is presented. Species studied included *Populus nigra*, *Montanoa bipinnatifida*, *Ficus elastica and Olea europaea*. [From authors' summary.] [For I and IV see *H.A.* 23: 70 and 25: 3653.] E.S.J.H.

65. Jacobs, W. P.
Occurrence of diffusible auxin in *Psilotum*.
Science, 1955, **122**: 597, bibl. 11.

Auxin has been reported to occur in at least some member of every major group of plants, with the sole exception of *Psilopsida*, an extremely primitive, rootless and leafless group of vascular plants. Diffusion tests have now shown the presence of auxin in thick, fast-growing stems of *Psilotum nudum* also. Treatment of cuttings with synthetic auxins, however, did not induce root initiation. It is concluded that auxin is not the limiting factor for root initiation in *Psilotum*.—Princeton Univ., N.J.

66. Kent, M. J.
Factors influencing curvature in the *Avena* test for plant hormones.
Science, 1955, **122**: 644, bibl. 4.

Pre-illumination of *Avena* coleoptiles by varying exposures to red light, or complete absence of light, during the 3 days of growth prior to testing did not consistently affect curvature. Neither did high temperatures have any noticeable effect. A marked increase in curvature, however, was found when the interval between the second decapitation and application of agar blocks was held to a minimum. For instance the response to 80μg/l. IAA was a curvature of 45·5° with a time lapse of 5 min., compared to 26·1° with a time lapse of 60 min. The time lapse between the first and second decapitation had a minor effect on the curvature response, the longer the interval the greater being the response. The results suggest that auxin regeneration within the coleoptile tip may be responsible for the striking differences in curvature response.—Pineapple Res. Inst. Hawaii, Honolulu.

67. Ahmadi, A. A., and others.
Comparison of two tests for auxin activity under various conditions.
Punjab Fruit J., 1955, **19**(70/1): 21-5, bibl. 5, illus.

A study was made of the effect on pea stem curvature and radish root elongation of parachlorophenoxyacetic acid and orthochlorophenoxypropionic acid at concentrations ranging from 0·01 to 10 p.p.m. and temperatures of 70, 80 and 90° F. The results and conclusions were: (1) The response to temperature change was very slight in pea and very marked in radish. (2) Pea gave a similar response to both chemicals but radish was less inhibited by PCA. (3) Increasing concentration increased pea stem curvature and decreased radish root elongation. (4) The pea stem curvature test is the better for auxin studies.—Cornell Univ.

68. Norman, A. G.
The effect of polymyxin on plant roots.
Arch. Biochem. Biophys., 1955, **58**: 461-77, bibl. 22.

One of the experiments described was on cucumber. Root growth was repressed by 5 p.p.m. polymyxin B, but the effect was nullified by the presence of 1×10^{-2} M calcium.—Univ. Michigan, Ann Arbor.

Propagation

(*See also* 117i, v, 144-168, 873, 1097-1099, 1236, 1254.)

69. Spiegel, P.
Some internal factors affecting the rooting of cuttings.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Among factors and treatments which affect or are remarked during the rooting of cuttings are the following: the application of fertilizer to mother plants; retention of the lowest bud on the cutting; respiration induced by steeping cuttings in water before planting, which results in an inhibitor being released into the water; cold treatment, which brings about a decrease in inhibitor effect, and the addition of low concentrations of synthetic coumarin which reduces rooting response; presence of high or low auxin or inhibitor values in different hybrids.—Minist. Agric., Jerusalem.

70. Lindemann, A.
Die Bewurzelungsfaktoren bei Stecklingen. **(Factors influencing the rooting of cuttings.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Under the headings of: Introduction, source of cuttings, metabolism and natural growth substances, synthetic growth substances, nature of shoot, temperature, moisture and rooting medium.—Regierungspräsid. Nord-Württemberg, Stuttgart.

71. de Boer, S.
The environment of the cutting.
From summary *Pap 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The environment of the cutting is all important. The best media and the acidity thereof vary for different plants. Choice must be made between pots, glasshouse or closed cases. Cases may be single or double and heated or unheated. Temperature and moisture are extremely important. Examples are given of results with different plants.—Exp. Stat. Arboriculture, Boskoop.

72. Hudson, J. P.
Propagation of plants by root cuttings. II. Seasonal fluctuation of capacity to regenerate from roots.
J. hort. Sci., 1955, **30**: 242-51, bibl. 13.

Batches of root cuttings of several different species were taken throughout the year and kept under different environmental conditions. Horseradish and dandelion regenerated strongly at all times and under all conditions. A seasonal variation in regeneration was observed with raspberry, black poplar, ragwort and herbaceous phlox; these show an "on"-season in winter and an "off"-season in summer. In ragwort the seasonal fluctuation was apparently connected with age, so that roots arising from the current season's crown will regenerate at a time when those from the previous season's crown will not regenerate. Root cuttings of dock showed little ability to regenerate. In further experiments with raspberry, aerial shoots of young established colonies of Lloyd George and Malling Promise were pulled out or cut off at ground level. After treatments at the end of April or in September or October, colonies regenerated rapidly and strongly by new root suckers. Colonies treated in June or July died or regenerated slowly. A classification is suggested for different types of regeneration from roots, based on (*a*) the relationship between parent plant and root suckers and (*b*) the circumstances under which the latter may arise naturally or be induced to grow by suitable treatment.—Univ. Nott. School of Agric., Sutton Bonington. [For Part I see *H.A.*, 24: 1240.]

73. Hess, C. E., and Snyder, W. E.
A physiological comparison of the use of mist with other propagation procedures used in rooting cuttings.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Tissue temperature and light intensity were found to be the factors having most influence on rooting in mist propagation. Consideration is given to the way in which optimum conditions are achieved by mist propagation, especially the intermittent system.—Dep. Flor. ornament. Hort., Cornell Univ., Ithaca, N.Y.

74. SNYDER, W. E., AND HESS, C. E.
An evaluation of the mist technique for the rooting of cuttings as used experimentally and commercially in America.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Various types of mist installation are described, the "in-bed" type being specially commended. Intermittent and continuous mist systems are compared. Advantages of mist technique are that cuttings from very soft wood can be used, that the time taken to root is shorter and that disease problems are very small.—Dep. Flor. ornament. Hort. Cornell Univ., Ithaca, N.Y. [See also *H.A.*, 25: 1954.]

75. TEMPLETON, J. W.
Mist propagation for the amateur horticulturist.
Nat. hort. Mag., 1955, **34**: 150-3, bibl. 1, illus.

A clearly illustrated description is given of a simply constructed soft-wood mist propagator with a capacity of 1,000 cuttings. It consists essentially of a 4-foot diameter bed of coarse sand with a mist nozzle projecting upwards through its centre and covered by an Ultron film hood on a hemispherical wire frame.

76. HUDSON, J. P.
The regeneration of plants from roots.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A classification of modes of regeneration is proposed, based on relationships between parts of the parent and the new plant, and reference is made to physiological implications of the different relationships. Conclusions are drawn on the potential use of root cuttings.—Dep. Hort., Univ. Nottingham. [See also *H.A.*, 25: 3410 and above abstr. 72.]

Seeds.

(*See also* 535-538, 557, 677-679, 791, 1238.)

77. CLARK, B. E., AND LITTLE, H. B.
The quality of seeds on sale in New York as revealed by tests completed in 1954.
Bull. N.Y. St. agric. Exp. Stat., 1955, **770**, pp. 61.

Information is given on flower, vegetable, lawn grass, field crop, and tree and shrub seed samples as follows: mechanical and varietal purity, germination, seed-borne diseases and seed treatments. Legume inoculant tests are described in an appendix.

78. SCARASCIA, G. T., AND VENEZIAN, M. E. S.
Variations metaboliques et mutabilité spontanée pendant la germination de graines de *Soja hispida, Cannabis sativa, Nicotiana* sp. d'age différent. (**Metabolic variation and the incidence of mutation during the germination of seed of different age in *Soja hispida, Cannabis sativa* and *Nicotiana* spp.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The considerable chemical changes which occur in seeds during storage are outlined. While the capacity for germination decreases with age, the likelihood of mutation is found to increase.—Lab. Genet. Ist. sci. sper. Tabac., Rome.

79. PERSSON, A. R.
Aluminium til plantekasser. (**Aluminium seed boxes.**)
Gartneryrket, 1955, **45**: 663-4, illus.

Seed germination and seedling growth were equally good in wooden and aluminium seed boxes. The merits of the latter are discussed. The price of an aluminium box, however, is about 10 times that of a wooden box.

Soil problems and irrigation.

(*See also* 1181, 222, 719, 720, 733c, 747, 764, 765, 958, 988, 997, 998, 1052, 1200, 1252, 1258.)

80. FIEDLER, H. J., AND BERGMANN, W.
Synthetische Bodenverbesserungsmittel im Gartenbau. (**Synthetic soil conditioners in horticulture.**)
Arch. Gartenb., 1955, **3**: 95-104, bibl. 15, illus.

In a soil treated with a sodium ammonium polyacrylate preparation germination and young growth of poppy, carrot, maize and radish were better and quicker than in untreated soil.

81. BERNSTEIN, L., AND AYERS, R. S.
Sloping seedbeds.
Calif. Agric., 1955, **9**(11): 8, illus.

Sloping seedbeds to reduce soil salinity danger in furrow-irrigated crops are shaped to allow conversion to normal flat-topped beds after seedling establishment. Sowing several inches below the crown of a sloping bed was most successful in avoiding the salinity hazard. Alternate furrows having sheer or gentle slopes, water is applied to the furrows which have gentle slopes. [See also *H.A.*, 25: 2815.]

82. HAYWARD, H. E.
Factors affecting the salt tolerance of horticultural crops.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Two factors which have an important bearing on the salt tolerance of crop plants are: (1) the availability of water to the plant as affected by salinity and soil moisture conditions, and (2) the toxic effects of certain ions which may be absorbed by plant roots. The author discusses how the effects of these factors are shown. He summarizes the relative salt tolerance of a number of horticultural crops under western United States conditions.—U.S. Salinity Lab., Riverside, Calif.

83. TERRA, G. J. A.
Suitability of plants for dry and saline regions.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Where no water reserves are present in a soil drought resistant plants alone can be grown. Often, however, the soil has its own water reserves such as ground water seepage water or available water (water between field capacity and wilting point), but only some plants are suited to such conditions. Certain plants found capable of growth under Indonesian conditions are named. Drainage may sometimes help considerably by providing better aeration. A study of both plants and soils is necessary.—Venlo, Netherlands.

84. OLIFEROV, A. N.
The water regime of terraced slopes. [Russian.]
Sad i Ogorod, 1955, No. 9, pp. 48-50, bibl. 1.

Observations in the Crimea in 1954 have shown that on terraces cut by the new universal bulldozer D-259 the soil moisture content was highest in the centre where vines, fruit and forest plants should be planted. It was also noted that the temperature on the soil surface of terraced northern slopes was 6-9° C. higher than that on the unterraced slopes, and their moisture content was 2-3% higher than that of terraced southern slopes.

85. HAGAN, R. M.
Factors affecting soil moisture—plant growth relations.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The real meaning of the term "available moisture" and the question whether soil moisture can be so regulated as to favour production of the particular plant organ or constituent for which the plant is grown are discussed. Rooting characteristics and their importance are considered, as also are problems of relating plant growth to soil moisture stress conditions which vary with both time and soil depth. Several ways in which weather factors influence soil moisture/plant growth relations are summarized. The economics of irrigating under particular conditions of moisture are dealt with.—Univ. Calif., Davis.

86. WITTE, K.
Die wichtigsten Probleme der Feldberegnung in Deutschland. (**The chief problems of sprinkler irrigation in Germany.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The main aims of sprinkler irrigation and to what extent they are fulfilled are considered. They are: (1) to make soil moisture adequate; (2) to apply fertilizer; (3) for environmental or microclimatic improvement; (4) to afford frost protection.—Landw. Fak. Univ. Bonn.

87. ORGANIZATION FOR EUROPEAN ECONOMIC COOPERATION.
Farm irrigation.
(*Publ.*) *O.E.E.C.*, 1955, pp. 203.

This report on a training course held in Greece in August/September 1954 under the sponsorship of the European Productivity Agency of the O.E.E.C. consists of 20 papers on technical, economic and other aspects of irrigation in Greece and elsewhere. Vegetables, tobacco, olives and vines are among the horticultural crops mentioned.

Nutrition.

(*See also* 117a, b, 118d, 1247.)

88. HOMÈS, M. V.
Determination rationnelle des besoins des plantes en éléments nutritifs. (**A rational method of determining the nutritive requirement of plants.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author gives a skeleton outline of his "method of systematic treatments", which is described in detail in *L'alimentation minérale des plantes et le problème des engrais chimiques*, Masson, Paris, 1953.—Inst. Physiol. végét., Univ. Libre, Brussels.

89. LYON, C. J.
Nutrient potassium from feldspar and mica.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xix.

Finely ground muscovite and microline in the form of perthite were used as a K source for plants rooted in either pure quartz sand for drip cultures or a sandy medium representative of a poor soil. In the drip cultures neither tomato nor tobacco could use the K released from the minerals by hydrolysis. In a rooting medium of quartz sand plus sedge peat, tomato and tobacco did not obtain potash from either muscovite or microline unless bacteria of the S oxidizing group were present in the medium. Inoculation tests with muscovite gave positive results with both tomato and tobacco.—Dartmouth Coll., New Hampshire.

90. WALLACE, A., AND OTHERS.
Behavior of chelating agents in plants.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 9-16, bibl. 10, illus.

Basic studies were made on the absorption of EDTA, toxic levels of EDTA in beans, distribution of iron and EDTA in plants, stability of EDTA in plants, and the relative effectiveness of various chelating agents. The following results were obtained: EDTA was absorbed by plants. When NaFeEDTA was applied to the soil, plants absorbed the entire molecule. The initial distribution of EDTA throughout the plant was essentially equivalent to that of the iron. EDTA was toxic to plants, but in varying concentrations to varying plant species. The EDTA as well as the chelated metal appeared to be the cause of the toxicity. The amount of EDTA producing toxicity for bean plants was equivalent to from 200 to 400 lb. per acre. At least part of the EDTA absorbed by plants remained as EDTA for a considerable time after absorption. There were indications that chelating agents correct lime-induced chlorosis by facilitating the entry of iron into plants and correcting an iron deficiency, but also that the chelating agents can effect translocation of iron in plants. Under glasshouse conditions chlorotic susceptible plants in lime soil with iron supplied with chelating agents grew almost as well as in soil where additional iron was not needed. NaFeDTPA seemed to result in better chlorosis correction than did the other chelating agents studied. Treatments made to chlorotic ornamental plants in the field lasted for only one season or year. Those treated late in the summer gave good response.—Univ. Calif., Los Angeles.

91. WALLACE, A., AND OTHERS.
Comparisons of five chelating agents in soils, in nutrient solutions, and in plant responses.
Soil Sci., 1955, **80**: 101-8, bibl. 10.

The chelating agents studied were EDTA, DTPA, HEEDTA and 2 newer compounds, viz. an aromatic amine (138) and cyclohexane-1,2-diaminotetraacetic acid (CDTA). Analysis of Fe contents were made. In nutrient solutions CDTA and 138 were rather more stable than the other chelates in the alkaline pH range. On a calcareous soil CDTA and 138 were considerably more stable than the other chelating agents; 138 did not become fixed to any appreciable extent on a clay soil. Chelates with and without Fe were supplied to bean plants growing in a calcareous soil; CDTA and 138 were most successful in supplying Fe. The chelate 138 resulted in a definite yield increase and was apparently non-toxic. Flowering bean plants were supplied with Fe^{59} from various sources; in the calcareous soil 138 resulted in several times as much Fe uptake as did other chelating agents. Avocado seedlings showed the greatest amount of leaf burn after EDTA and HEEDTA applications: other chelates appeared to have little effect. There were indications that 138 was absorbed by the plant, even on the first day after application.—Univ. Calif.

92. TANADA, T.
Effect of sulfydryl inhibitors on the absorption of rubidium by excised mung bean roots.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxiv.

Copper and phenyl mercuric nitrate markedly increased radiorubidium absorption by excised mung bean roots in the absence of Ca. Radiorubidium absorption in the presence of Ca was greatly reduced by the action of these compounds.—U.S.D.A., Agric. Res. Serv., Beltsville, Md.

93. MURPHY, W. S., HUNTER, A. H., AND PRATT, P. F.
Absorption of rubidium by plants from solution and soils.
Proc. Soil Sci. Soc. Amer., 1955, **19**: 433-5, bibl. 10.

Dwarf beans were grown in sand culture with different ratios of K and Rb in the nutrient solution, and the distribution of the 2 elements was measured in the various plant parts. The molar ratios of K/Rb found in the plants differed from those in the solutions. There was a significant difference between K/Rb ratios in the various plant parts. Growth and fruit production in beans were reduced where molar ratios of K/Rb were less than 5/1.—Ohio Agr. Exp. Stat., and Ohio St. Univ.

94. GLENDENING, B. L., PARRISH, D. B., AND SCHRENK, W. G.
Spectrographic determination of rubidium in plant and animal tissues.
Analyt. Chem., 1955, **27**: 1554-6, bibl. 18.

Procedure is described. Rb contents are given for a number of vegetables, some tropical crops, and for apples, pecans, raisins and dates.—Kansas St. Coll., Manhattan.

95. TANADA, T.
Effect of ribonuclease on the absorption of rubidium by excised mung bean roots.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxiv.

Excised mung bean roots were exposed to ribonuclease action for 10-20 minutes. Such roots absorbed more radiorubidium than control roots in the absence of Ca. When Ca was present in the absorption medium, rubidium absorption decreased markedly.—U.S.D.A., Agric. Res. Serv., Beltsville, Md.

96. BREAZEALE, E. L., AND MCGEORGE, W. T.
Specificity of voltage potentials in cation uptake by plants.
Soil Sci., 1955, **80**: 319-24, bibl. 4.

In previous experiments [see *H.A.*, 21: 3201 and 23: 3747] in which the electropode was used to study cation uptake by plants, voltages of 2·10, 2·13, 2·20, and 2·23 were used as more or less specific for Na, K, Ca, and Mg respectively. Further experiments indicate that these applied voltages represent points of maximum uptake of the respective cations rather than actual specific voltages. There is an overlapping range of cation uptake and this is greatest for cations with the voltages in closest proximity. The degree of overlapping varies with the length of time the plants are continuously held at the different voltages. When tomato plants were subjected to the respective cation voltages for Na, K, Ca, and Mg for 7 days, the degree of specificity was greater for the last 3 days than for the first 3 days. The specificity of voltage and cation uptake by plants vary somewhat with experimental conditions. [From authors' summary.]—Ariz. agric. Exp. Stat.

Soilless culture.

(*See also* 871, 875.)

97. HOMÈS, M. V.
Comparaison de différents modes d'aquiculture. **(Different methods of water culture.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Investigations sponsored by I.R.S.I.A. have been carried out for some years by the Centre d'Études et de Recherches sur l'Aquiculture (CERA) and an account of them is given here. Six methods and their advantages and disadvantages are described.—Inst. bot. Physiol. végét., Univ. Libre, Brussels.

98. LINKE, H.
Die Torfwand. **(The peat wall.)**
Dtsch. Gartenb., 1955, **2**: 240-2, bibl. 4, illus.

In Germany peat mixtures have been used to erect walls and other structures on which annual and perennial plants are grown in soilless culture. In view of the water holding capacity of the medium watering and manuring (with a 0·5% fertilizer solution) require only infrequent attention. Attractive results were achieved with this technique in exhibitions and on other occasions. The method is described and illustrated and suitable plants are listed.

Artificial illumination.

99. CANHAM, A. E.
The electric lamp in British horticulture.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The difficulties of light measurement are described, and the electric and physical properties of the most important types of gas discharge and filament lamp are discussed from the point of view of their suitability for light irradiation purposes and their relative economics. The use of the high pressure mercury vapour lamp is described and the use of the tungsten filament lamp for photoperiod control and for bulb forcing is also discussed.—Field Stat., Rur. Electr. Sect., Reading [See also *H.A.*, 25: 2341.]

100. Kristoffersen, T.
Commercial and economical aspects of plant production by artificial light.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Consideration has been given in Norwegian trials to the following factors: (1) source of light, whether incandescent, fluorescent, or high-pressure mercury vapour lamps, (2) light intensity, (3) day length, (4) temperatures during illumination, (5) cultural methods. Plants forming the experimental material included sweet peas, stocks, snapdragons, begonias, tomatoes and cucumbers. Findings are examined from an economic standpoint.—Agric. Coll., Vollebekk, Norway.

101. Roodenburg, J. W. M.
Modern equipment for plant irradiation with artificial light.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author discusses methods whereby the illumination afforded by high wattage lamps can be improved economically. He also notes useful adaptations of ordinary fluorescent tubes and modern developments, which have facilitated stronger illumination by tungsten filament lamps during the day.—Lab. Light Res. Hort., Utrecht, Netherlands. [See also *H.A.*, 25: 2342.]

102. Chaumier, P.
Les applications du photopériodisme en France. (**The use made of photoperiodism in France.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The three directions which French research on applied photoperiodism has followed have concerned, (1) cultivation of plants in artificial light only, (2) artificial light applied to frames and glasshouses, (3) artificial light for cultivating house plants. These are discussed.—"Sodel", Paris.

Glasshouses and frames.

(*See also* 11, 13, 99-102, 726, 732p.)

103. Reinhold, J.
Fragen des Gewächshausbaues. (**Glasshouse construction problems.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The tendency now in Germany is to seek the ideal general-purpose glasshouse rather than one for one special purpose only. The Institute at Grossbeeren has worked on the subject and its conclusions are given here. They concern dimensions, type of material, ventilation, normal and artificial lighting and the provision of sprinkler irrigation.—Inst. Gartenb., Berlin-Grossbeeren.

104. van den Muijzenberg, E. W. B.
Further development of glasshouse construction.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Lighter frames and larger panes of glass are being used, plastic is forcing its way in as a glazing material. Wider houses afford easier soil manipulation. Houses are higher so to afford better ventilation, and some are air conditioned. Heating systems are being improved. The use of artificial illumination with mercury tubes as an extra source of light is increasing. There is a tendency to use well-insulated rooms, e.g. bulb sheds out of use for growing plants.

105. Lawrence, W. J. C.
The control of glasshouse environment.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The environment to be controlled consists of soil and air. Much has been done on potting composts, but work is necessary on the conditioning of soil *in situ.* Improved glasshouse design to attain optimum use of light and heat is under investigation at the John Innes.—John Innes, Instn, Hertford.

106. Éder, S.
A növények fényigénye és az üvegházi üvegek fényáteresztő képessége. (**The light requirement of plants and the light transmissibility of greenhouse glass.**) [English and Russian summaries ¾ p. each.]
Agrártud. Egy., 1952 (issued 1954), **16** (3, Part 1): 149-58, bibl. 6.

The light transmission capacity of various types of glass was measured in the region of maximum chlorophyll absorption, i.e. at 600-700 mμ wavelength. It was found that sunshine glass transmitted 92-94% of the light, mirror (window) glass 83-88%, but cast machine-made glass, generally used for greenhouses, only 40%.

107. Renard, W.
Der Einfluss von Glas und Plastik auf das Gewächshausklima unter besonderer Berücksichtigung von Dachneigung und Aufstellungsrichtung. (**The effect of glass and plastic on glasshouse climate as related particularly to slope of roof and aspect.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A study is presented of the different controllable factors affecting climatic conditions in the glasshouse.—Inst. Tech. Gartenb. tech. Hochsch. Hannover-Herrenhausen, Germany.

108. Spice, H. R.
New plastic film saves glasshouse heat.
Grower, 1955, **44**: 601-4, illus.

A special grade of polythene sheeting has been used to line glasshouses, thus obtaining the advantages of double glazing. The sheeting cost just over ½d. per sq. ft., and allows penetration of 92% of the ultra-violet, visible and infra-red light. Tomato, cucumber and cyclamen growth has been promoted in lined houses, but as a result of higher humidity care with ventilation is necessary.

109. Spice, H. R.
Must you have glass for a glasshouse?
Grower, 1955, **44**: 1048-50, illus.

The use of plastic lining as a heat insulator for mushroom houses is discussed. Lettuces, tomatoes, beans, cucumbers, mint and some pot plants have been successfully grown in a plastic "greenhouse", of plastic 0·005 in. thick. Between April and August there was no indication of deterioration due to exposure of the plastic film.

110. Businger, A.
Some remarks on glasshouse heating.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The results of ordinary hot water heating can be improved by the use of fans which make the temperature more uniform. A trial is recorded of another method of achieving greater uniformity namely increasing radiation by the use of heat transfer liquids and of specially shaped aluminium screens.—Inst. hort. Engng, Wageningen.

111. Morris, L. G.
Steam sterilisation of glasshouse soils.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author discusses important methods of saving fuel used for steam sterilization of soil by attention to moisture content of soil, to size of boiler output and to covering the soil during the process of steaming.—N.I.A.E., Silsoe.

112. Gordon, M.
Die Torfeinfütterung, ein Verfahren zur Erleichterung und Verbesserung der Topfpflanzenkulturen. (**Peat to simplify and and improve the culture of pot plants.**)
Dtsch. Gartenb., 1955, **2**: 239-40, illus.

A simple method of watering and manuring pot plants in the greenhouse is described which seems to have originated in Holland. The pots are placed in a 8-10 cm. layer of peat covering a non-waterproof bench, which will allow the percolation of surplus water. Uniform water and fertilizer distribution is assured by feeding the peat with a 0·1% fertilizer solution from a perforated plastic hose (maximum length 15-17 in.) laid across the middle of the bench.

113. Smirnov, N. A.
Mechanisation of opening frame sashes. [Russian.]
Sad i Ogorod, 1955, No. 7, pp. 34-5, illus.

A description is given of a simple apparatus for raising multiple frame sashes from all 4 sides by means of a winch. [See also *H.A.*, 24: 71.]

Equipment.

(*See also* 117d, k, m, s, x, 247, 248, 438, 439, 1245.)

114. Pfeiffer, R., Brunskill, R. T., and Hartley, G. S.
A variable dosage sprayer for agricultural experiments.
Nature, 1955, **176**: 472-3.

The machine designed by the authors "makes it possible with one filling to spray continuously decreasing concentrations starting from an arbitrary upper limit. A whole spectrum of results is thus made available for examination in far less time than is consumed in getting less complete results by the established method."—Chesterford Park Res. Stat., nr. Saffron Walden, Essex.

115. Arthur, I. P.
An evapotranspirometer.
Aust. J. agric. Res., 1955, **6**: 707-12, bibl. 3, illus.

The equipment is designed to measure evapotranspiration from a growing crop. It comprises a large container filled with soil and set in the field, so that the top is flush with the ground surface, and a device for measuring changes in weight of the contents. The crop in the container is therefore grown under conditions which approximate closely to those in the surrounding field.—[Author's summary.]—C.S.I.R.O., Maribyrnong, Victoria.

116. Closs, R. L., and Jones, R. L.
The construction and installation of gypsum soil-moisture meters.
N.Z.J. Sci. Tech., Sect. B, 1955, **37**: 150-7, bibl. 5, illus.

The construction of small cylindrical gypsum blocks for use as soil-moisture meters is described. At least three replicate measurements are needed to detect a significant difference of 0·2 between two daily means of the order of 3·5 with a 90% probability. [From authors' summary.]—Dom. phys. Lab., Lower Hutt.

Noted.

117.

a Allerton, F. W.
A recent advance in the correction of trace element deficiencies.
J. roy. hort. Soc., 1955, **80**: 416-20, bibl. 1.
The value and use of sequestrenes. [See *H.A.*, 25: 2377.]

b Benjaminsen, J., and Jensen, J.
En kolorimetrisk metode til bestemmelse af fosforindholdet i planter. (**A colorimetric method of determining the phosphorus content of plants.**) [English summary, 7 lines.]
Tidsskr. Planteavl, 1955, **59**: 96-105, bibl. 11.

c Bleton, C.
L'agriculture en Chaouïa. (**Agriculture in Chaouïa.**)
Terre maroc., 1955, **29**: 249-52.
The horticultural crops grown are coriander, geranium, vegetables, olive, almond, fig and vine.

d Bloodworth, M. E., Page, J. B., and Cowley, W. R.
A thermoelectric method for determining the rate of water movement in plants.
Proc. Soil Sci. Soc. Amer., 1955, **19**: 411-14, bibl. 4, illus.
For measuring stream flow rates in plant stems without damaging the plants.

e Brown, J. G., and Jackson, R. K.
A note on the potentiometric determination of chloride.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 187, bibl. 2.
In plant material.

f Čaĭlahjan, M. H.
The effect of daylength on the character of carbohydrate-protein metabolism in leaves of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 373-6, bibl. 12, illus.

g Carr, D. J.
On the nature of photoperiodic induction. III. The summation of the effects of inductive photoperiodic cycles.*
Physiol. Plant, 1955, **8**: 512-26, bibl. 20.

h Cavell, A. J.
The colorimetric determination of phosphorus in plant materials.
J. Sci. Food Agric., 1955, **6**: 479-80, bibl. 4.

i Creech, J. L., Dowdle, R. F., and Hawley, W. O.
Sphagnum moss for plant propagation.
Fmrs' Bull. U.S. Dep. Agric., **2085**, 1955, pp. 10, illus. 10 cents.
Properties, preparation and uses.

j Denise, G.
La normalisation des fruits et légumes. **(The standardization of fruits and vegetables.)**
Rev. hort., Paris, 1955, **127**: 1316-19, illus.
French standards.

k Ellenwood, C. W., and Yoder, J. T., Jr.
Two methods of tree removal.
Ohio Farm and Home Res., 1955, **40**: 52-3, illus.
Dynamiting with or without prior lopping of the main branches.

l Fjäderhane, A. M.
Importen av trädgårdsprodukter åren 1911-1953. **(Swedish imports of horticultural products 1911-1953.)**
Medd. Alnarpsinst. trädgårdsekon. Byran **19**, 1955[?], pp. 122.

m Friend, W. G.
A cabinet for aseptic manipulations.
Canad. Ent., 1955, **87**: 370-2, bibl. 2, illus.
Used for both insect and plant materials.

n Golding, E. W.
Electric heating in horticulture.
J. roy. hort. Soc., 1955, **80**: 408-16, bibl. 6, illus.

o Groszmann, H. M.
Hybrid vigour in horticultural crops.
Qd agric. J., 1955, **81**: 79-82, illus.

p Gustafson, F. G., and Lindenmayer, A.
Determination of Fe^{55} in plant material by the thiocyanate method.
Plant Physiol., 1955, **30**: 182-4, bibl. 5.

q Henderson, J. H. M.
Further variations in response of oat and pea sections to 2,4-D and other substances.
From abstr. in *Plant Physiol.* 1955, **30** (Suppl.): vi-vii.

r Hitchcock, A. E., Sanford, W. W., and Zimmerman, P. W.
Measurement of fluorescent substances extracted from tomato seedlings and separated by paper chromatography.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): iii.

s Hubbard, R. A.
Brush chipper economics.
Amer. Nurserym., 1955, **102**(5): 48-9.
Notes on use and costs.

t Ledin, G.
Orientering om det aktuella läget för svensk trädgårdsodling. **(The present position of horticulture in Sweden.)**
Sver. pomol. Fören. Årsskr, 1954, 1955, **55**: 118-29.

u Lewis, D.
Sexual incompatibility.
Sci. Progr., 1955, **43**: 593-605, bibl. 4.
The mechanism, systems and evolution of sexual incompatibility in plants.

v Marston, M. E.
The history of vegetative propagation in England.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen—Dep. Hort., Univ. Nottingham, *see note p. 4.* [See also *H.A.*, 25: 3409.]

w Masuda, Y.
Der Einfluss des Heteroauxins auf die Plasmapermeabilität für Harnstoff und Alkylharnstoffe. **(The effect of heteroauxin on the permeability of protoplasm to urea and alkylurea.)**
Physiol. Plant., 1955, **8**: 527-37, bibl. 17.
Onion bulb scales and *Avena* coleoptiles used as test objects.

x Morgan, N. G.
A prototype leaf-sampling disc-cutter.
A. R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 171-2, illus.
Designed to prevent packing of the discs.

y Mortensen, E.
Trends in production and consumption of fruit and vegetables.
Mon. Bull. agric. Econ. FAO, 1955, **4**(9): 3-10.
World statistics.

z Rice, E. L., and Rohrbaugh, L. M.
Effects of temperature on the immobilization of 2,4-dichlorophenoxyacetic acid in bean leaves in darkness.
Bot. Gaz., 1955, **116**: 261-6, bibl. 2, illus.
Due chiefly to high temperatures.

118.

a Rowat, R., and Glover, W. C.
Scotland and Northern Ireland—advisory services.
FATIS Rev., 1955, No. 3, pp. 67-70, illus.

---

* For parts I and II see *ibidem*, 1953, **6**: 672 and 680.

b RUCKENBROD, H.
Untersuchungen über den Umsatz der Chlorogensäure in höheren Pflanzen. **(Research on the metabolism of chlorogenic acid in higher plants.)**
Planta, 1956, **46**: 19-45, bibl. 50.
In *Helianthus annuus* and *Hedera helix*.

c RUNDFELDT, H.
Über die Auswertung von Blockversuchen. **(On the evaluation of block trials.)**
Züchter, 1955, **25**: 252-5, bibl. 4.

d SALZER, E. H.
Ein Gerät zur Konzentrationsmessung von Nährlösungen. **(An apparatus for measuring concentration of nutrient solutions.)**
Schweiz, Gärtnerztg, 1955, **58**(45): 4-5, bibl. 1, illus.
By electric current.

e SCHWEITZER, O.
Die Feldhecken von Stroischen im Kreise Meissen [Lommatzscher Pflege]. **(Windbreaks in Saxony.)**
Dtsch. Gartenb., 1955, **2**: 254-6, illus.
Hedge composition and sequence of planting.

f SHEPHERD, F. W.
Shrubs and trees for the production of shelter hedges for horticultural crops.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.
Problems met with in the south-west of England.

g SIMINOVITCH, D., SWANN, I., AND PHILLIPS, W. R.
Survival of senescing apple tissues in culture.
Abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*,* p. 8.

h TANNER, C. C.
The statistical approach in crop protection.
Chem. Ind. Lond., 1955, No. 34, pp. 1046-54, bibl. 3.

i THAINE, R., AND WALTERS, M. C.
Experiments on the application of autoradiographic techniques to the study of problems in plant physiology.
Aust. J. biol. Sci., 1955, **8**: 354-68, bibl. 18, illus.

j TROY, D. J.
Measurement of atmospheric pollution by ultraviolet photometry.
Analyt. Chem., 1955, **27**: 1217-21, bibl. 8.
Sensitive, portable apparatus described.

k TUKEY, H. B.
Symbiotic relation of biology and economics in the marketing of fruits and vegetables.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 1-8, bibl. 8.

l WOLFE, J.
Buying a sprinkler system Here's how!
Stat. Bull. Ore. agric. Exp. Stat., **548**, 1955, pp. 12, illus.
Sprinkler equipment, layout and operation.

---

* Formerly *A.R. Canada Department of Agriculture, Fruit and Vegetable Products Research Committee, Ottawa.* The report now consists only of abstracts of papers; further details may be requested from the authors.

TREE FRUITS, DECIDUOUS

General

(*See also* 117y, 260c, i, j, k, q, r, u, 1255, 1261, 1262, 1285f.)

119. GINAI, M. A.
Plum growing in Baluchistan.
Agric. Pakistan, 1953, **4**: 167-98, 307-17, bibl. 18, illus.

This article will be full of interest to plum growers in different parts of the world, since the authors provide detailed information on most phases of plum production in Baluchistan. Subjects covered include ecology, propagation, orchard practices, varieties, diseases and pests.

120. BEARE, J. A., AND HARRIS, J. B.
An orchard is rebuilt. Experience at the Government Experimental Orchard, Blackwood.
J. Dep. Agric. S. Aust., 1955, **58**: 429-33, 435, illus.

A method of replanting an old orchard is described. The original orchard was largely a variety collection, on loam or sandy loam over a clay sub-soil and had lost organic matter and fertility. Unproductive blocks of trees were removed and the land was graded and replanted on the contour. Soil fertility was built up by growing green manure crops, by application of waste organic matter and by reducing cultivations. Supplementary irrigation is being used to improve tree growth and fruit size.

121. WYE COLLEGE, DEPARTMENT OF ECONOMICS
Fruit yields in Kent.
Comm. Gr, 1955, No. 3122, p. 892.

The average tree and acre yields for the chief apple and pear varieties in 1954 are tabulated. Comparison is made with the average annual yield for 1950-54, and the highest yield per acre in 1955. Percentage variation in yield per acre is also shown.

122. IVČENKO, S. I.
The cherry in forests of the Ukraine. [Russian.]
Priroda, 1955, **44** (9): 99-100, illus.

Areas where *Cerasus* [*Prunus*] *avium* occurs in deciduous forests are named. The trees provide seed for raising rootstocks and material for shelter belts and further forest planting; they are also of interest in breeding for frost resistance.

123. VOGEL, R.
Études poursuivies au Maroc sur le figuier. **(Studies on the fig in Morocco.)**
Terre maroc., 1955, **29**: 377-88, illus.

Studies were made on: (1) Smyrna types with reference to abundance of *Blastophaga psenes*, richness in pollen, disease, and presence of predators of *Blastophaga*; (2) the technique of caprification with a view to determining varieties requiring fertilization; (3) caprification in the Beni-Amir district; (4) varieties; (5) drying yards.

124. Neal, O. M.
Sarviceberry—an edible ornamental.
A.R.W. Va agric. Stat. 1953-1954, issued as
Science Serves your Farm, *Bull.* **363**, Part 4,
1954, pp. 3-4, 8, illus.

The sarviceberry is a native American species of *Amelanchier* which may have possibilities for planting both as a dessert fruit and as an ornamental. The trees are frost hardy even after flowering. Two selected plants in West Virginia were studied for fruit size and yield; berries from the first picking were the largest in both cases, and total yields were 28 lb. and 16·8 lb. Fruit is obtained 2 years after sowing.

125. Slate, G. L.
Minor fruits.
Nat. hort. Mag., 1955, **34**: 139-49.

Notes are given on the characters and culture in New York State of *Diospyros virginiana*, *Asimina triloba*, *Actinidia* spp., *Amelanchier alnifolia*, *Sambucus canadensis*, *Viburnum trilobum*, *Shepherdia argentea*, *Prunus spp.*, *Morus alba*, *Chaenomeles lagenaria*, *Mespilus germanica*, *Elaeagnus multiflora* and *Ribes odoratum*.

Breeding and varieties.

(*See also* 145-147, 260d, h, l, m, o, p, 261c, d.)

126. Venjjaminov, A. N.
Advances in breeding stone fruits. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 26-30.
Advances in Soviet fruit breeding. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1955,
20(5): 25-30, bibl. 2.

Both papers report progress in breeding sweet and sour cherries, plum, apricot and peach, and the second also deals with apple, pear and small fruits.

127. Belohonov, I. V.
Creative use of I. V. Mičurin's teachings.
[Russian.]
Sad i Ogorod, 1955, No. 10, pp. 12-15.

The director of the Mičurin Scientific Research Institute for Fruit Growing gives an outline of its achievement and working methods in fruit breeding; the main objective is hardiness.

128. Čerevatenko, A. S.
Mičurin's methods in peach breeding.
[Russian.]
Sad i Ogorod, 1955, No. 10, pp. 30-2.

Attempts at Samarkand to obtain frost resistant peach trees by crossing peaches with plums were unsuccessful, but a so-called vegetative hybrid was produced. In July-August fruit buds of young hybrid peaches were budded into mature frost-resistant plum trees. The following spring when the buds opened the flowers were pollinated with peach pollen and any peach leaves were removed as they appeared. Of 350 flowers 25% set, and of these 35 (10% of total number of flowers) matured with well-developed stones. Morphologically the hybrid fruits resembled those of the peach mother plants though they were smaller, more elongated and with much longer stalks. The flavour was similar to that of the original peaches but sweeter, having a 16% sugar content as against 11·86%. Seedlings of the vegetative hybrid grew more vigorously during the early period and had darker green, more veined and serrated leaves than the mother plants, and were more frost resistant than any other peach.

129. Oppenheimer, C.
Breeding of apples with low chilling requirements.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A survey is given of the so far limited success achieved by a breeding programme started in Israel in 1939. Seedlings have been selected for low chilling requirement, vigour, fruit quality, yield, and resistance to mildew and aphis. So far 4 varieties have been released to the trade. The work continues and the production of triploids is contemplated.—Lab. hort. Plant Breed., Rehovot, Israel.

130. Bishop, C. J.
The production of bud sports in apples through the use of artificial radiation.
From summary in *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*
Bishop, C. J., and Aalders, L. E.
A comparison of the morphological effects of thermal neutron and X irradiation of apple scions.
Amer. J. Bot., 1955, **42**: 618-23, bibl. 22, illus.

Dormant Cortland apple scions treated with two levels of thermal neutron irradiation and two levels of X irradiation were framework-grafted into grown apple trees, an average of 160 scions per tree being inserted. Untreated scions of the same variety were grafted in separate trees for control purposes. When the effects of the two types of radiation were compared at dosages that gave equal inhibition of shoot growth, the thermal neutron radiation produced approximately twice as many bifurcations per inch of growth as did the X radiation. If, as is postulated, the shoot bifurcations are due primarily to the effect of the radiation on the chromosomes, and the shoot growth in an index of total radiation damage, thermal neutrons would appear to be much more effective than X radiation in causing chromosome changes. Because of the probable close relationship between radiation-induced chromosome aberrations and gene mutations it is suggested that thermal neutrons may be more effective than X-rays as a mutagenic agent for producing bud sports in apple varieties. [Authors' summary of 2nd article.]—Exp. Stat., Kentville, N.S.

131. Zwintzscher, M.
Die Auslösung von Mutationen als Methode der Obstzüchtung. I. Die Isolierung von Mutanten in Anlehnung an primäre Veränderungen. (**The induction of mutations as a method of fruit breeding. I. The isolation of mutants.**)
Züchter, 1955, **25**: 290-302, bibl. 21, illus.

The author has developed a new method of treating fruit trees with X-rays to induce mutations: young trees in the nursery stage were dug up and their tops were pruned to leave one leader and two lateral shoots in the same plane. These were then cut back and exposed to different degrees of radiation. On replanting, the trees made good growth. On the assumption that the base of a shoot arising from a treated area is a reservoir of mutations, these shoots were cut back repeatedly and their buds worked on rootstocks. Mutants of apples and cherries induced and isolated by this method are described and illustrated.—Max Planck Inst. f. Züchtungsforsch. [Erwin Baur Inst.], Voldagsen.

132. Johansson, E.
En mindre vanlig sektorialchimär i tetraploid äpplesort. **(An uncommon sectorial chimaera in a tetraploid apple variety.)**
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 186-7, illus.

Two fruits of a tetraploid apple variety had a wide, rusty-coloured sector between the yellow ground colour and the red covering colour.—Alnarp.

133. Nilsson, F.
Röda fruktsorter få ökad betydelse. **(Red fruit varieties need more attention.)**
Sver. pomol. Fören. Årsskr, 1954, 1955, **55**: 130-3, illus.

The author discusses the red sports of seven apple varieties and of one pear variety which are being propagated in Swedish nurseries.

134. Johansson, E.
En mutation i fruktfärg hos äpplesorten Åkerö. **(A mutation in the fruit colour of the apple variety Åkerö.)**
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 184-5, illus.

A Sävstaholm apple tree reworked to Åkerö was found to have a shoot bearing a mutation of Åkerö fruits which strongly resembled Sävstaholm fruits. The leaves of this shoot were of the Åkerö type. The fruits and leaves of the two varieties and the mutant are illustrated.

135. du Plessis, S. J.
Selection of stud orchards.
Decid. Fruit Gr, 1955, **5**: 183, 192-4.

The Department of Agriculture for South Africa has invited applications for the registration of orchards of particular varieties as disease-free "stud" orchards for the provision of clean nursery material. The introduction of stud selection for nurseries is the next step.

136. Anon.
Jonadel, een nieuw appelras. **(Jonadel, a new apple variety.)**
Cult. Hand., 1955, **21**: 375.

Jonadel has been bred at Iowa State University (U.S.) from a cross between Jonathan and Golden Delicious. It flowers and ripens at the same time as Jonathan, but the fruit is somewhat larger and darker red; it is not susceptible to Jonathan spot, scald or internal breakdown in storage and will keep until May.

137. Anon.
De roman van de Scarlet Pimpernel. **(The story of the Scarlet Pimpernel.)**
Fruitteelt, 1955, **45**: 912-13, illus.

Scarlet Pimpernel is a selection of Stark Earliest which ripens in Holland during the first 3 weeks of August. The fruit is medium-sized with crisp flesh and of a clear light red colour. Growth has been good on several soils and rootstocks. It is reported as being fairly scab-resistant and it has not yet been attacked by canker; mildew does occur but not seriously.

138. Murawski, H.
"Erwin Baur"—eine neue ertragreiche Apfelsorte. **(Erwin Baur—a new high-yielding apple variety.)**
Dtsch. Gartenb., 1955, **2**: 279-80, bibl. 3, illus.

Young trees of Erwin Baur, a seedling of "Geheimrat Dr. Oldenburg", on MIX, gave higher and more regular yields than other varieties in the trial. It was also less susceptible to late frosts. The fruit is described.

139. Johansson, E.
Sort- och grundstamförsök med äpple III vid Alnarp 1941-1954. **(Apple variety and rootstock trials III at Alnarp 1941-54.)** [Summaries in English and Esperanto, p. 1¼ each.]
Medd. Trädgårdsförs. Malmö **91**, 1955, pp. 21, bibl. 6, illus.

For earlier reports on the same series of trials see *H.A.*, 17: 1168 and 24: 118. The present communication presents data on two further trials, one of which showed certain dessert varieties to be unsuitable for Swedish conditions. In the second trial M.IV and XVI were compared as rootstocks for Cox's Orange and some closely related varieties. Yields of all varieties during the period 1944-54 were higher on M.XVI, though not always significantly so; in the case of Ingrid Marie the difference was very marked, yields being 26 and 47 kg. per tree per year on M.IV and XVI respectively. The flavour of this variety is very good, though inferior to that of Cox's Orange, and its yields on M.XVI greatly exceeded those of Cox.

140. Hotz, E., and Lüthi, H.
Bericht über die Prüfung sortenreiner Apfel- und Birnensäfte. **(Report on tests of varieties for apple and pear juice.)**
Schweiz. Z. Obst-u. Weinb., 1955, **64**: 368-72.

Apples producing juice of the most satisfactory quality were those of the varieties Grauer Hordapfel, and Leuenapfel. The best pear varieties were shown to be Theilersbirne, Spitzbirne and Sülibirne.

141. Williams, R. R.
Perry pears and their characters: II.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 52-9, bibl. 3, illus.

The series of descriptions of perry pear varieties [see *H.A.*, 25: 116] is continued with a further 11 varieties from Gloucestershire and Herefordshire. Commercial as well as morphological characters are described. For each variety drawings are presented of a typical fruit in longitudinal section, together with a flattened spur leaf. The typical winter appearance of mature trees is illustrated by photographs.

142. Steyn, P. A. L.
South African-bred dessert peach varieties.
Fmg S. Afr., 1955, **30**: 313-17, 326, illus.

Information is given on 3 white-fleshed, freestone varieties. Culemborg, Van Riebeeck and Swellengrebel. All show resistance to delayed foliation.

143. Gavrilović, M.
Uzroci napuštanja požegače i mere za njihovo otklanjanje. (**Causes of decline in popularity of the plum variety Požegača and means of preventing it.**) [English summary 1½ pp.]
Arh. poljopr. Nauk., 1955, **8**(20): 81-108, bibl. 22, illus.

Factors affecting the reduction of performance of the economically important Požegača plum, the popularity of which is declining, include soil deterioration, poor cultivation practices and susceptibility to certain pests and diseases, notably the virus disease šarka (*Prunus* virus 7) [see also *H.A.* 25:1447]. Suggested remedies are: propagation by grafting instead of from suckers, preferably on seedlings of the plum variety Petrovača, planting on new sites in fertile soil, protection against pests and diseases, good soil management, selection of the more economical types of the variety and improvement in the method of drying fruit for prunes.

Propagation and rootstocks.

(*See also* 69-76, 139, 143, 229, 260a, n, w, x, z, 261a, 316, 943.)

144. Abbott, D. L.
Temperature and the dormancy of apple seeds.
From summary in *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The seed of the apple contains a dormant embryo which must be after-ripened at a low temperature before germination can take place. After-ripening is a reversible process and dormancy can be re-imposed by subjecting an incompletely after-ripened seed to a warm temperature—a phenomenon often referred to as secondary dormancy. There is moreover a compensation temperature of ±17° C. (for the two varieties studied) at which the rate of both reactions is balanced and the capacity for germination remains constant. What follows from the acceptance of this concept is discussed.—Long Ashton Res. Stat.

145. Braak, J. P.
Effect of some external and internal factors on embryo and seedling development of the cherry.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The aims of artificial culture of cherry embryos are (1) to get viable seedlings from the early ripening varieties, (2) to shorten the juvenile phase of seedlings by breaking the dormancy of newly-harvested seeds. Tukey's technique was followed and his results were confirmed. Further trials showed that the yield of well grown seedlings could be increased by the use of sugar in the culture medium, a low temperature treatment at the start of the culture period and a long day treatment of the potted seedlings in late summer and autumn.—Inst. Plant Breed., Wageningen.

146. Hesse, C. O., and Kester, D. E.
Germination of embryos of Prunus related to degree of embryo development and method of handling.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 251-64, bibl. 8.

Lesley and Bonner [*H.A.*, 23: 2541] have shown that with early varieties of peach storage of the seeds in the fruits can be used to bring about germination of the embryos. The purpose of the present work is to confirm these results with peaches and to extend the investigation to almonds, plums and cherries. Germination of embryos cultured at the time of sampling was compared with germination after 1-5 months' storage. The results were related to the developmental status of the embryos at the time of sampling. The work has demonstrated the feasibility of germinating embryos of *Prunus* species at stages earlier than has been reported previously. It has also shown that developing embryos are not necessarily abortive or non-viable, even though from early maturing varieties, but will not germinate if cultured immediately or become non-viable if dried for subsequent nursery stratification.—Univ. Calif., Davis.

147. Kester, D. E., and Hesse, C. O.
Embryo culture of peach varieties in relation to season of ripening.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 265-73, bibl. 20, illus.

The responses of 14 peach varieties to embryo culture were studied. The varieties could be divided into 3 general groups. Group 1 consisted of early ripening varieties whose embryos could not be germinated with the culture methods used. The embryos had not attained their maximum size and had not accumulated adequate reserves. Group 2 included varieties whose embryos could be germinated by embryo culture immediately upon harvesting the fruits but were not viable after stratification. The embryos of these varieties had attained full size and had accumulated more reserves than those of the first group. Sucrose was essential for germination of the earlier varieties of this group. Group 3 consisted of varieties whose embryos could be easily germinated either immediately after harvest or after stratification. Their level of reserves enabled them to maintain viability. The limiting factors in germination of early ripening peach varieties were shown to be, (1) developmental stage of the embryo at the time of harvest, and (2) the method of handling.. The progressive increase in germinating ability throughout the season is correlated with accumulation of reserves.—Univ. Calif., Davis.

148. Thiele, I.
Künstliche Zwillingsbildung bei Äpfeln durch Samenteilung. (**The induction of twin formation in apples by dividing the seed.**)
Züchter, 1955, **25**: 313-15, illus.

Halving of suitably prepared apple and pear seeds produced uniform twins for research at an early developmental stage. The seedlings can be halved again at the end of the first growing season by a longitudinal cut through stem and root.—Tech. Univ. Berlin.

149. Solovjeva, M. A., and Kocjubinskaja, V. N.
Effect of storage conditions of seed on germination and yield of standard rootstocks. [Russian.]
Sad i Ogorod, 1955, No. 9, pp. 53-5, illus.

Results of storage experiments in the Ukraine indicate that apple and pear seed with a moisture content of not more than 10-11% may be kept in a sealed bottle or desiccator with calcium chloride at 2-10° C. for over 2 years without appreciable loss of germinating capacity or seedling vigour.

150. Taleĭsnik, E. D.
Propagation of *Prunus tomentosa* by seed. [Russian.]
Sad i Ogorod, 1955, No. 9, pp. 47-8, illus.

In the Soviet Far East it was found better to propagate *P. tomentosa* by seed than by grafting. The majority of the seedlings produced good or very good quality fruit.

151. Garner, R. J.
The interplay of factors influencing rooting behaviour of shoot cuttings.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Factors are grouped under source, handling and environment. More attention should be paid to treatment of shoots destined for use as cuttings when growth is complete. The aim with a shy rooting subject is to sensitize it by hormonal stimulation and warmth. Varietal behaviour is a very important factor, but the difference in response as between different parts of the shoot should also be remembered. Rooting factors should not be considered in isolation for there is powerful interaction between cultural source, treatment with hormonal substance and external environment.—East Malling Res. Stat.

152. Hatcher, E. S. J., de Boer, S., and Garner, R. J.
The influence of soil environment on the behaviour of apple and plum cuttings.
J. hort. Sci., 1955, **30**: 268-81, bibl. 6, illus.

Hardwood cuttings of selected rootstock varieties were planted on three soils, a strip polder at Boskoop, an artificial island at Bradbourne, East Malling, and a loam at East Malling. Myrobalan B plum cuttings rooted readily but were sensitive to source condition, growth substance treatment and soil environment. In 1949-50 rooting was good both at Boskoop and in East Malling loam though, in the latter, seasonal drought resulted in scanty growth. Bradbourne island soil proved injurious, especially to second cuttings. Brompton plum cuttings rooted well, with no regular source differences, and tolerated better the adverse island conditions. The drought effect in 1949-50 on the loam was again observed. Crab C apple cuttings rooted poorly and were the least sensitive to soil environment. Non-rooted cuttings survived better than did those of the plums. The cuttings likewise varied in sensitivity to growth substance, their response also reflecting the soil differences and those attributable to source and seasonal variation. Observations at Boskoop showed correlation between root and shoot development. A seasonal reduction in rooting was probably associated with colder soil, and soil temperature may have limited the rooting of Crab C. Storage of cuttings prior to planting has proved not only practicable but necessary, for in addition to avoiding adverse open soil condition it is of great potential value in providing opportunities for better environmental control in the early life of the cutting. The sensitivity of cuttings to soil environment is discussed. [Authors' summary.]—Imp. Coll., London, Proefstat. Boomkw., Boskoop, and E. Malling Res. Stat., Kent.

153. Floor, J.
Moisture as a factor in the rooting of cuttings.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

The author considers how the new mist techniques are being manipulated so that they may be used successfully for the rooting of fruit tree cuttings. He notes the moisture control uses of polyethylene.—Inst. hort. Plant Breed., Wageningen.

154. Nelson, S. H.
Propagation by leaf bud cuttings.
Amer. Nurserym., 1955, **102**(8): 11, 41.

Leaf bud cuttings were taken from *Malus robusta* No. 5, a hardy semi-standard rootstock, and were propagated outside under continuous mist or in an airtight glass-topped propagating frame. Cuttings taken from a stool-bed gave higher rooting than those from 17-year-old stock trees, or those from 2-year-old nursery trees. Sphagnum or vermiculite were the best rooting media. Shading was necessary in the propagating frame, and 2 or 3 layers of cheese-cloth or 1 of burlap proved the most efficient. Continuous mist showed promise as a technique for rooting leaf bud cuttings of this stock, but abscission was heavy.—Centr. exp. Fms Serv., Ottawa.

155. Bajwa, B. S., Kaura, N. R., and Chhada, T. R.
Comparative vigour of apple trees of Baldwin variety produced by grafting on apple roots, seedlings and suckers.
Indian J. Hort., 1955, **12**: 29-31.

Growth of young Baldwin trees was compared in relation to their method of propagation. Annual growth increments in 1952 and 1953 were the same with all trees. In the first 3 years the total growth of root-grafted trees was similar to that of trees grafted on seedlings, but was greater than that of those on suckers. The seedlings were of commercial varieties and the root pieces and suckers were from local orchards.—Dep. Agric., Punjab.

156. de Haas, P. G.
Neue Beiträge zur Sämlingsunterlage bei Kernobst. (**The use of seedling rootstocks for pome fruits.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

The author discusses the devices whereby the likelihood of obtaining uniform seed, seedlings [and hence rootstock material] are enhanced at Sarstedt and notes the considerable progress achieved.—Inst. Obstb., Sarstedt, Germany. [See also *H.A.*, 25: 2433.]

157. Maurer, K. J.
Über einige Provenienzen des Birnensaatgutes für die Unterlagenanzucht. (**Sources of pear seed for rootstock breeding.**)
Saatgut-Wirtsch., 1955, **7**: 254-6.

Studies with *Pirus communis* var. *caucasica*, *P. ussuriensis*, *P. betulifolia*, *P. salicifolia* and *Crataegus oxyacantha* are briefly reviewed.

158. Karnatz, H.
Über die Eignung der generativen Nachkommenschaften einiger Kernobst-Kultur. sorten für Unterlagenverwendung in Deutschland. **(The suitability of the seedling progeny of certain pome fruit varieties for use as rootstocks in Germany.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Trials at Jork have disclosed the existence of a large number of pear and apple varieties, the progeny of which, derived from open pollination, are notable for uniformity, vigour and disease- and cold-resistance. Among them are those of Graham's Jubilee and Bittenfelder Seedling apples and of the Kirchensaller Mostbirne pear. Results are discussed.—Obstbauversuchsanst. Jork.

159. N.S.W. Department of Agriculture.
Apple and pear rootstocks.
Fruit World, Melbourne, 1955, **56**(9): 29.

In this short report some results of rootstock trials at Bathurst Experiment Farm are briefly summarized. Northern Spy, although it has generally proved a fairly good stock, has been a failure under hot conditions as compared with Malling and seedling stocks. A selection of *Pyrus calleryana* (D6) was outstandingly superior to all other types tested and is recommended as a first choice for pears.

160. Atkinson, J. D.
The performance of Malling apple stocks in New Zealand.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The performance of Malling stocks in New Zealand has followed the pattern of that in England. Recently losses caused by *Phytophthora cactorum* have necessitated reconsideration of the position, in which connection some of the Merton stocks show promise for possible replacement of XII and XVI, but a stock with high resistance to *P. cactorum* is still lacking.—Fruit Res. Stat., D.S.I.R., Auckland, N.Z.

161. Margolin, A. F.
Frost resistance of individual types of dwarf rootstocks. [Russian.]
Sad i Ogorod, 1955, No. 8, pp. 59-61.

From observation made in the Ukraine after the severe winter of 1953/54 it appears that for the apple varieties tested Doucin III and Paradise VIII were the most reliable rootstocks, while Doucin II and Paradise IX were satisfactory for only the more frost resistant varieties. In these trials wild apple stocks were found to be less frost resistant than the dwarf rootstocks.

162. Khan, K. A. W.
Studies on stocks immune to woolly aphis of apple (*Eriosoma lanigerum* Hausm.).
Punjab Fruit J., 1955, **19**(70/1): 28-35, bibl. 5.

Crab, the commonest rootstock in the Punjab, is highly susceptible to woolly aphis. Investigations showed that 4 local rootstocks were completely immune, namely, Shiara (*Pyrus communis* var. *shiara*), Shegal (*P. pashia*), Reons (*Cotoneaster bracillaris*) and quince (*Cydonia vulgaris*). Six important apple varieties were grafted on these 4 stocks, on crab and on 4 Merton stocks and the trees were exposed to attack. The results were: (1) The Merton stocks were highly resistant but lost their resistance slightly after grafting. (2) Quince was completely immune after grafting but did not transmit resistance to the scion. (3) Reons transmitted resistance to the scion. Flowering and fruit set were normal in 3-year-old trees on Shiara, Shegal and Reons, fruit size and colour were very good and flavour was much better than on crab. The work was done in the Kulu Valley, Kangra district, Punjab in 1937-41.

163. Taper, C. D., and Murray, H. R.
Growth and yield of McIntosh apple scions as influenced by the use of various rootstock-interstock varietal combinations.
Canad. J. agric. Sci., 1955, **35**: 492-9, bibl. 6.

A field experiment with top-worked apple trees was conducted over a 13-year period in order to study the effects upon the scion variety, McIntosh, of the three rootstock varieties Malling I, Malling II and Antonovka and the two interstock varieties Osman Crab and Hibernal. These were included in all possible combinations of a rootstock variety with an interstock variety. The data concerning widths of crowns, heights and trunk circumferences are indicative of uniformity with respect to size and general conformation. The widths and heights of the experimental trees lay within ranges which approximated those for standard McIntosh trees of the same age. However, the differences between width and height tended to be greater in the case of the latter than in the case of the experimental trees. The scion: interstock circumference ratio was always less than 1 in the case of trees with the interstock variety Hibernal, and always greater than 1 in the case of trees with interstock variety Osman Crab. There was no relationship between the ratio and the yielding ability of the scion. The yield of trees upon the semi-dwarfing rootstock variety Malling II was significantly greater than the yield of trees upon the vigour-inducing rootstock variety Malling I. Neither interstock nor the interaction between rootstock and interstock had a significant effect upon yield. [Authors' abstract.]—Dep. Hort., Macdonald Coll., Que.

164. Blair, D. S., and others.
Apple rootstock and framework investigations at Ottawa, Canada, 1936-1954.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Presenting survival, growth and yield results up to the 18th year of grafting McIntosh and other apple varieties on Anis, Antonovka, *Malus baccata* seedlings and M.I, II, IX and XII. The performance of Cortland, Lawfam, Melba, McIntosh and Sandow on 11 hardy stem-builders is also presented.—Div. Hort. Centr. Exp. Farm Ottawa.

165. Maggs, D. H.
The inception of flowering in some apple rootstock varieties.
J. hort. Sci., 1955, **30**: 234-41, bibl. 6.

The inception of flowering was studied in apple rootstocks using self-, cross-, and non-budded trees of M.II, M.IV, M.IX, and M.XVI. When the trees flowered for the first time, rootstock and scion variety influenced both the proportion of trees which flowered and the number of inflorescences per tree. This influence was apparent irrespective of whether the variety was used as stock or scion. Flower production decreased in the order IX, II, IV and XVI. The proportion of trees flowering and number of inflorescences produced was higher in budded trees than in non-budded trees. There was a clear relation between the the proportion of trees flowering and the average number of inflorescences per tree. Trees allowed to fruit bore fewer inflorescences in the following year than those which had been deblossomed. Two sequences were noted in the effects of the previous year's blossom on flowering in the current year, namely an inverse relation (biennial bearing effect) and a direct relation. Deblossoming tended to reverse the trend of each sequence. No patterns in axillary inflorescence position along the terminal shoot could be found.—E. Malling Res. Stat., Kent.

166. Aubert, P.
Essais de culture de la variété de poire Doyenné du Comice. (**Cultural trials with Doyenné du Comice pears.**)
Rev. romande Agric. Vitic., 1955, **11**: 85-6.

Owing to its excessive vigour and consequent low yields Doyenné du Comice is seldom grown commercially in Switzerland. In 1945 trials were laid down in which the variety was grown either as an espalier or a pyramid on the non-vigorous Angers quince with and without intermediate stocks of the non-vigorous varieties Beurré-Clairgeau, Williams' Bon Chrétien and Louise-Bonne d'Avranches. The trees came into bearing in 1950, and in 1955 so much fruit was set that thinning was necessary. Yield data are presented. Pruning and manuring are briefly discussed.

167. Campbell, A. I.
Rootstocks suitable for some new plum varieties raised at Long Ashton: nursery trials.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 60-2: bibl. 4.

The new plum varieties Teme Cross, Severn Cross, Frome Cross and Thames Cross were tested on 5 commercial rootstocks. Tables record percentage take. From the results obtained it appears that Brompton and Common Mussel make a satisfactory union with all 4 varieties. Myrobalan B gave doubtful results with Frome Cross. Common Plum was completely incompatible with Frome Cross while Teme Cross was very variable on this stock. Marianna seems quite unsuited for Teme Cross, Severn Cross and Frome Cross. On the other hand Thames Cross produced strong trees on Marianna but it was noticed that all the trees had severe ringspot virus symptoms on the leaves of the scion, although neither the rootstocks nor the parent budding material showed any symptoms of this disease.

168. Dostálek, J.
Vliv podnože na velikost plodu Althannovy renklody. (**Effect of rootstocks on the size of Reine Claude d'Althan fruits.**) [Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd. Rostl. Vyroba, 1955, **28**: 639-48, bibl. 5.

The size of the fruit produced by Reine Claude d'Althan dwarf trees on vegetatively propagated EM St. Julien A, zwetschen root sucker, EM Damas C, EM Myrobalan B and on St. Julien seedling (Páv's selection) was studied over 2 seasons. Fruit from the variety on its own roots was also observed and yields were considered. Fruit size was found to vary greatly depending on the size of the tree, smaller trees producing smaller fruits. The smallest fruit was produced by trees on EM St. Julien A followed by the zwetschen root sucker; the yield index of trees on EM Damas C was relatively low. Self-rooted trees produced the largest fruit but gave low yields. According to these results the most suitable rootstocks for the gage are EM Myrobalan B and St. Julien seedling.

Pollination

(*See also* 18.)

169. Weiss, K.
Über den Insektenbeflug der Obstblüte im Alten Land. (**On insects visiting fruit blossom in the Alte Land.**)
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 253-5, bibl. 6.

A table shows the composition of the insect fauna visiting the blossom of stone and pome fruit trees at temperatures below and above 15° C. and at distances from the nearest bee hive of less than 100 m. and of 100-200 m. Below 15° C. the percentage of honey bees was never less than 67·7% and above 15° C. it always exceeded 80%.

170. Williams, R. R.
Pollination requirements of cider apple varieties: II. Progress report, 1954.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 38-46, bibl. 1.

Pollination and pollen germination tests were carried out in 1953 and 1954 to try to find the reason for the high proportion of self-sterility reported earlier [see *H.A.*, 24: 130]. It was confirmed that Dabinett, Michelin, Sweet Coppin and Stoke Red may be self-fertile, Yarlington Mill which had previously proved sterile, Dove, Frederick, Hangdown, Kingston Black, Reinette Obry and Tardive Forestier all produced 10% or more initial set when selfed. Court Royal, Backwell Red and Sweet Alford again failed to set an appreciable number of fruits when selfed. A similar result was obtained with Bédan des Partes, Belle Norman, Ellis Bitter, Fréquin Audievre, Improved Foxwhelp, Langworthy and Tremlett's Bitter. There is evidence to suggest that the self- and cross-fertility potential of a variety may vary from season to season.

171. Sedov, E. N.
The viability of apple pollen as affected by methods of after-ripening and storage. [Russian.]
Agrobiologija, 1955, No. 3, pp. 134-6.

Apple pollen dried (for 2-4 days depending on variety) in the shade germinated better than when dried in direct sunlight. Shade dried pollen was stored in a desiccator over calcium chloride in direct sunlight, in diffused light or in darkness, and also in paper bags in a box. Periodical germination tests over 2 months have shown that pollen stored in darkness remained the most viable, followed by that stored in diffused light. Storage in paper bags was the least satisfactory.

172. Maliga, P.
Badacsonyi és Germersdorfi cseresznye termékenyülési adatai. (**Data on the fertilization of the Badacsony and Germersdorf cherry varieties.**) [English and Russian summaries 1½ pp. each.]
Agrártud. Egy., 1952 (issued 1954), **16**(3, Part 1): 27-49, bibl. 9.

The 2 most popular and best quality Hungarian cherries, Badacsony and Germersdorf giants, are unproductive when grown alone. Studies were conducted in 1947 and 1952 to find pollinators for these varieties and for the pollinators themselves. The pollination requirements of some other varieties were also determined, and the time of blossoming of Hungarian cherries was established and classified.

173. Welkerling, E. M. L.
Problemas de autoincompatibilidad sexual en variedades de almendro y damasco. (**Problems of self sterility in almond and apricot varieties.**)
Idia, 1955, No. 85, pp. 1-2, illus.

In studies at the Junín sub-station of the Mendoza National Experimental Station the 12 named almond varieties investigated were all self-sterile, and all the 18 named apricot varieties, except Damasca, were self-fertile.

Planting.

174. Prince, V. E., Havis, L., and Scott, L. E.
Effect of soil treatments in a greenhouse study of the peach replant problem.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 139-48, bibl. 13.

A greenhouse study was made on the problem of replanting old peach orchards to peaches. Soil used in these tests was obtained from a peach orchard in which there had been considerable difficulty in establishing replants. Treatments used included high-magnesium lime, calcium sulfate, magnesium sulfate, sodium carbonate, steam sterilization, fumigation, nutrient-solution addition, and potassium fertilization. Young Elberta trees were planted in the soil to which the treatments were applied and grown during the spring and summer of 3 different seasons. The most striking response was obtained from the addition of relatively low rates of the high-magnesium lime. Steam sterilization and fumigation also gave somewhat greater growth of the trees. It is recognized that much of the response obtained is not well understood and that the results of this study may be applicable only to the particular soil used. [From authors' summary.]—U.S. Dep. Agric., Beltsville, Md, and Univ. Md, College Park.

175. Savage, E. F., and Cowart, F. F.
The effect of size of nursery stock on subsequent growth and production of peach trees.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 149-54, bibl. 8.

The data obtained in these studies indicate that little difference can be expected in the performance of the usual graded sizes of peach nursery trees after they are transplanted to the orchard. Trees 2-3 ft. in height reached about the same size after 2 growing seasons as did trees 4-5 ft. in height and of comparatively large trunk diameter. At the end of the fifth year trees of the very largest size planted (5-6 ft. in height) were still slightly larger than the other sizes of nursery stock. This small difference in size was not found to have any effect upon yielding capacity of the trees in later years. Small trees are cheaper, are easier to transplant, and are more readily trained into desirable shapes. [From authors' summary.]—Ga agric. Exp. Stat., Experiment.

Training and pruning.

(*See also* 117s, 260t.)

176. Dullum, N.
Forsøg med forskellig stammehøjde til æbletræer. (**Experiments on height of stem in apple trees.**) [English summary, p. 1.]
Tidsskr. Planteavl, 1955, **59**: 62-72.

Data are presented of a test in which two heights of stem, 0·5 m. and 1m., were compared in two apple varieties, Beauty of Kent and Lane's Prince Albert worked on crab, during the period 1924-1950. The bush form (0·5 m.) was found to induce more vigorous growth than the ½-standard form, especially in the less vigorous Lane's Prince Albert. With this variety bush trees yielded the largest crops, the relative figures for bush and ½-standard trees being respectively 100:58 for the first 10 years and 100:71 for the whole period. With Beauty of Kent bush trees were superior only during the first 10 years (100: 84), while ½-standards began to outyield the lower trees later on so that total yields were about equal by 1950. No attempt has been made to evaluate fruit quality or ease of management.—Blangstedgaard.

177. Williams, R. R.
The production of cider fruit on bush trees: observations on yields and orchard behaviour 1950-53. Final Report.
A.R. Long Ashton agric. hort. Res. Stat. 1954, 1955, pp. 30-7, bibl. 5.

A series of trial plots were established in 1935 at Long Ashton and 8 other centres to investigate the possibility of growing cider varieties as bush trees [for progress reports see *H.A.*, 12: 796, 13: 738, 18: 2407, and 20: 2318]. In this final report crop yields or estimates are tabulated and orchard behaviour of the different varieties is summarized. It is concluded that a small number of vintage varieties can be relied upon to produce good bush trees with a heavy cropping potential in a reasonably short period. These trees are apparently successful under a very wide range of environment and management. Varieties in this group are Bulmer's Norman, Dabinett, Sweet Alford and Yarlington Mill. It should be noted however, that Sweet Alford has been reported to fail on some light soils. The following varieties were successful on the sites where they were grown: Chisel Jersey, Michelin, Reinette Obry and Sherrington Norman. Of the remainder, Ellis Bitter, Perthyre, Red Jersey, Stoke Red and White Close Pippin, have been moderately successful. It is not advisable to consider the following varieties for general planting: Cap of Liberty, Dove, Dymock Red, Fair Maid of Devon, Frederick, Improved Foxwhelp, Kingston Black, Knotted Kernel, Upright Médaille d'Or, Reine des Pommes, Royal Wilding, Silver Cup, Slack-ma-girdle, Tardive Forestier or Woodbine.

178. Burroughs, L. F.
The production of cider fruit on bush trees. Vintage quality trials: concluding report.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 173-8, bibl. 9.

The results of vintage quality trials of cider apples grown on bush trees during 1942-53 are summarized [for earlier progress reports see *H.A.*, 14: 1478 and 16: 1787]. The locality at which the fruit was grown is shown to influence the composition of the juice and the vintage quality of the cider. Notes are given on the vintage quality of 12 varieties of good orchard behaviour. [For a report on orchard behaviour and yield of the varieties tested, see previous abstract.]

179. van Stuivenberg, J. H. M.
Begrijpsverwarring om de vrije Palmet? **Misunderstanding as to the free "palmet"?)**
Fruitteelt, 1955, **45**: 844-5, illus.

The free "palmet" is a tree form in which 4-6 laterals ("layers") are trained at an angle of 180°, on 2 sides of the main stem. Fruiting wood is formed on these laterals by bending down year-old shoots after mixed buds have been formed. Shoots forming on the main stem, which are not to serve as "layers", may also be bent to form fruiting buds. After 2 years the fruiting shoots are cut back and replaced by new young shoots. —Rijkstuinbouwconsulent, Kesteren.

180. van Stuivenberg, J. H. M.
Het omvormen van vrije spillen tot vrije palmetten. **(Remodelling spindle bush [trees] to free "palmet".)**
Fruitteelt, 1955, **45**: 904-5, illus.

In the experimental garden at Kesteren young Jonathan and Herring Pippin trees, grown as spindles, were pruned and trained according to the "palmet" system. The tree was "flattened" by cutting out strong wood not growing in the row direction. The lowest "layer" was selected and laid horizontally, and the shoots were bent down. Where two strong shoots grew close together one was retained for a season as an "auxiliary layer". The second layer was chosen 80-90 cm. higher, and cut back; the rest of the shoots were bent down or laid horizontally. This remodelling could be useful where fillers had been planted as spindle bushes on the hedge system, as it would enable them to be retained for a few more years with less interference to growth of the permanent trees.

181. Canisius, J. J.
Het omvormen van struiken tot vrije spillen. **(The change from bush form to free spindle.)**
Fruitteelt, 1955, **45**: 932-3, 937, illus.

The pruning and training necessary to transform a bush tree to a free spindle are described. The success of this transformation depends on variety, rootstock, form of bush, age of tree and the experience of the grower.

182. Padfield, C. A. S.
Dressings for tree wounds: testing of materials.
Orchard, N.Z., 1955, **28**(7): 7-11, bibl. 1.

Trials with a wide range of wound dressing materials have been made on special wounds on Crimson Cox, on normal pruning wounds on Dougherty, and to some extent on Winter Nelis. Apart from "seal a stik" putty, none of the new types of dressing compared favourably with petroleum or the thicker bituminous materials. Raw linseed oil used for making up dressings damaged the trees. Fungicide incorporation did not improve the ability of petrolatum to prevent silver leaf. Results suggested that the inclusion of plant growth substances was unwarranted on the ground of cost.

Growth and physiology.

(*See also* 260g.)

183. Zeller, O.
Entwicklungsverlauf der Infloreszenzknospen einiger Kern- und Steinobstsorten. **(Flower bud development of some pome and stone fruits.)**
Angew. Bot., 1955, **29**: 69-89, bibl. 20, illus.

The development of flower buds was studied with apple, pear, cherry and peach varieties in 1953-54. After the start of floral initiation development progressed swiftly from the end of June to the beginning of October 1953. Between December and February development was much slower but still visible in pear and most apple varieties. Floral development in cherry and peach stopped during winter but both were then at a more advanced stage than were the pome fruits at that time. The date of restarting or acceleration of flower-bud development in spring (March/April) was dependent on environment. Flower differentiation of 1-year-old spurs of Beauty of Bath, Belle de Boskoop and Spätblühender Taffet started slightly later than that of 2-year-old spurs, but the difference had disappeared by October. Floral initiation in terminal buds of fruiting laterals was 1-3 weeks behind that of the spurs, and in Spätblühender Taffet differentiation lasted longer. "Post-flowering" inflorescences of apple and pear were initiated and continued development throughout winter and into spring. A study of the development of individual flowers in the inflorescence showed that in the racemose umbel of *Prunus* the development of each flower was parallel. Inflorescence development in the pleiochasial raceme of the pome fruits was uneven, particularly in the pear varieties studied. In general, in all apple and 2 pear varieties (Williams' and Herzogin Elsa) the terminal flower was the most advanced followed by the basal flowers, the sub-terminal flowers being the most backward. In the pear varieties Stuttgarter Geisshirte and Gellerts Butterbirne the basal flowers were more advanced than the terminal one. During the experiment no correlation was found between start of floral initiation and time of flowering in pear or most apple varieties, the exceptions being Beauty of Bath and Spätblühender Taffet.—Inst. für Obstb. Gemüseb., Stuttgart.

184. Kolomiec, I. A.
Biological characteristics of the development of flower buds and flowers of apple trees.
[Russian.]
Sad i Ogorod, 1955, No. 10, pp. 15-20, illus.

Experiments have shown that for the first phase in the cycle of development of apple flowers, i.e. bud formation, a high cell sap concentration in the tissues of the growing points is necessary, while the second phase, i.e. final development and opening of the buds, occurs at a low cell sap concentration [see also *H.A.*, 23: 172, 1544 and 2605]. The first phase begins in summer and under normal conditions takes 25-30 days, and the second starts in autumn but in the main takes place the following spring over a period of 20-35 days. By providing certain conditions the two phases can be made to run consecutively and the complete cycle accomplished in 50-60 days during the summer, thus avoiding dormancy or low temperature effects and resulting in secondary or autumn flowering. Under natural conditions autumn flowering occurs when the early summer is dry and the cell sap concentration high, inducing early flower bud formation, followed by mid-summer rains reducing the sap concentration and causing buds to go through the second phase of development rapidly and to flower. Prolonged drought resulting in leaf shedding or the destruction of leaves by pests or diseases has a similar effect.

185. HENDERSHOTT, C. H., AND BAILEY, L. F.
Growth inhibiting substances in extracts of dormant flower buds of peach.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 85-92, bibl. 24.

A substance has been extracted from peach flower buds that completely inhibits straight growth of short segments of etiolated pea epicotyls. This inhibitor is soluble in ether and water and is very stable. It does not appear to be indole acetic acid or a substance similar to auxin in activity. The inhibitor was prominent in flower bud extracts in December and increased to a maximum in early February. A rapid decline in the level of the inhibitor occurred in mid-February. This may have been associated with the breaking of the rest period. An increase in inhibitory activity occurred during late February and early March just prior to bloom. The cause of this has not been established but it may indicate a build-up of auxin at the time of bud opening, as observed by other investigators. [Authors' summary.]—Univ. Arkansas, Fayetteville.

186. BAXTER, P.
Bud size and fruit production of apple trees.
J. Dep. Agric. Vict., 1955, **53**: 409-13, bibl. 3, illus.

For two successive years dormant spur-buds of three apple varieties were tagged and their diameter measured with a watchmakers "Douzieme" gauge. Following bud burst, the number of leaves and flowers, if any, were recorded, as was the number of fruit set after the final drop. Diameter of dormant spur-buds ranged from 2·5 to 6·0 mm. The percentage of spur-buds developing flowers increased with increasing bud size up to 4·5 mm. The number of leaves and flowers produced by flower buds and the number of fruits produced per 100 buds was also proportional to the size of dormant buds [see also *H.A.*, 14: 60]. The percentage of buds developing flowers and the number of fruits set for a given bud size, however, varied between trees and between years and was related to the mean bud diameter for that tree, an "off" year being preceded by relatively small buds while a large mean bud diameter indicated an "on" year. The possible use of the average size of dormant spur-buds in forecasting the cropping potential of apple trees is pointed out. [Author's summary.]

187. VISSER, T.
De karakteristiek van appelbloemen en-vruchten in verband met hun positie in de tros. (**Fruit and flower characteristics of apple in relation to their position in the cluster.**) [English summary ¾ p.]
Meded. Dir. Tuinb., 1955, **18**: 809-22, bibl. 31, illus.

The effect of flower position in the inflorescence on fruiting was studied in Golden Delicious, Laxton's Superb, Cox's Orange Pippin and Jonathan. From results and the literature surveyed the following conclusions are drawn. The arrangement of the flowers within the cluster was a 2/5 spiral. Fruit set and weight of individual fruits were positively correlated with the number of flowers in the cluster. The percentage of flowers which set fruit was approximately constant and was not related to the number of flowers in the cluster. The terminal flower was dominant with regard to initiation, flowering and fruit set. In general the fruit setting potentiality in lateral flowers decreased from base to apex, though fruit set in the lowest flower was sometimes less than in those immediately above it. It was suggested that the foliage leaves supporting the lower flowers may be responsible for their greater setting ability. The terminal flower was particularly susceptible to frost damage which resulted in reduced fruit size of the terminal fruit, and thus increased yields from lateral fruits. June-drop was negatively correlated with seed content of the fruits, and fruit size at harvest was positively correlated with seed content. Terminal flowers generally produced fruits with more ovules than in those from lateral flowers, but the former sometimes contained fewer or lighter seeds. Progressing from the base to the apex of a 5- or 6-flowered cluster, stem length decreased and fruit length increased. With some varieties many terminal fruits were beaked. Growth of terminal fruit was probably continued longer than that of lateral fruits, so that ripening was later and they were more susceptible to some storage disorders. Yield uniformity and quality would be improved by thinning terminal and upper lateral fruits and by removal of weak clusters.—Lab. Tuinbouwpl., Wageningen.

188. HASKELL, G., AND DOW, P.
The stamen patterns of cultivated plums.
Ann. Bot. Lond., 1955, **19**: 467-84, bibl. 29.

Stamen numbers were counted from flowers of cultivated plum varieties (*P. domestica*), seedling clones from crosses between varieties, and six other *Prunus* species. Varieties have a wider range of stamen number than the presumed parental species, *P. spinosa* and *P. cerasifera*, and extend from 15·3 to 33·0 stamens. Counts on varietal and seedling clones indicate genetical control of stamen pattern; clones have uniform patterns, but differ from one another. Annual climatic variations affect stamen number, with varieties reacting differently. There are relationships between stamen numbers and some economic characters. Stamen patterns may be helpful as an additional diagnostic character and for the identification of bud-sports. [Authors' abstract.]—John Innes hort. Instn, Bayfordbury, Herts.

189. Stanković, D., Bebić, D., and Pavićević, B.
The transpiration of apple trees, with special reference to some measures for regulating it.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A progress report on investigations in 3 different places in Serbia subject to different ecological conditions.—Fac. Agric., Belgrade.

190. Ashizawa, M., and Nakagawa, M.
Studies on fruit physiology in relation to water. I. On seasonal variations in the water relations of fruit trees. [Japanese, with English summary ¾ p.]
Tech. Bull. Kagawa agric. Coll., 1955, **6**: 260-72, bibl. 48.

The water relations of outdoor pot plants of apple, pear and persimmon were studied from May to December 1953, a period characterized by drought and high temperatures from late July to late August. The chief results were: (1) water consumption by apple and persimmon was 4-6 times and 2-5 times higher respectively on fine than on rainy days, increased gradually from the end of June to late July when it increased rapidly, and was 45% higher during the drought than in September, (2) water losses by transpiration were similar throughout the season in apple and persimmon and were greater when the soil moisture content was higher; in pear they were approximately twice as much on the exposed as on the shaded side of tree during the drought, (3) water losses by transpiration were correlated with growth and with atmospheric evaporation.

191. Dragavcev, A. P.
The relation of the anatomical structure of the leaves of cultivated apple trees to the altitude at which they grow. [Russian.]
Bot Žurnal, 1954, **39**: 766-8, bibl. 10, illus.

Data are presented showing that under mountainous conditions the structure of apple leaves changes not only under the influence of altitude but also with the aspect of the slope. The three varieties studied reacted differently to these conditions.

192. Trevisan, M.
Studio morfologico sulle foglie di *Morus alba* L. di alcune varietà Giapponesi-Cinesi ed Italiane. (**Morphological studies on the leaves of some Japanese, Chinese and Italian varieties of *Morus alba*.**)
Agric. Venezie, 1955, **9**: 423-30.

The dimensions and weight of the leaves of 7 Japanese and Chinese varieties were compared with those of the Italian varieties Florio and Selvatica. Only Aka Gi and Komaki compared with Florio in length, breadth and thickness, and the fresh weight per 100 leaves was much higher in Florio than in any other variety.

193. Gregory, F. G., and Hancock, C. R.
The rate of transport of natural auxin in woody shoots.
Ann. Bot. Lond., 1955, **19**: 451-65, bibl. 23.

A method is described for the estimation of the rate of movement and the quantity transported of the natural growth hormone in standard isolated segments of apple shoots. During controlled storage diffusible auxin is collected, and later by dividing the standard length of stem into small sections the location of the auxin front is determined, from which the rate of transport is deduced. Temperature markedly affects both rate of transport and amount of auxin transported, a maximum occurring at 27-30° C., followed by a rapid fall to zero. The total diffusible auxin in a given length of stem is not affected by storage temperatures below 30° C., but falls to zero at 42° C. The rate of transport and amount transported are proportional to the oxygen tension over the range 0 to 5% O_2, and there is some evidence for destruction of auxin in tensions below 2%. [Authors' abstract.]—Imp. Coll. Sci., Lond.

194. Hoyle, D. A.
Preliminary studies on the growth of fruit plants in relation to photoperiod.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

No significant differences occurred in Cox's Orange Pippin and Worcester Pearmain apple extension growth or reproduction following exposure to day lengths of 8, 13·5 and 17 hours. Blackcurrants, however, were markedly photoperiodic and vegetative growth increased with increase in length of day, 8-17 hours, in two seasons.—Dep. Hort., Univ. Reading.

195. Kolesnikov, V. A.
Knowledge and control of the plant's root and overground systems ensure high yields of apple trees.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Work is surveyed on the results of photosynthesis and transport to and from roots. There are two main periods of root growth in the Moscow region, spring and autumn, unless watering allows the process to continue during the summer. Mulching helps slightly to conserve moisture. It is essential to ensure the optimum inter-related functioning of both roots and leaves. How best to achieve this by cultural methods is suggested.—[See also *H.A.*, 25: 3552.]

196. Marcellin, P.
Repérage des lenticelles perméables aux gaz à la surface d'un fruit. (**Locating lenticels permeable to gases on the surface of a fruit.**)
C.R. Acad. Sci., Paris, 1955, **240**: 108-11, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2398.

The position of open lenticels on the surface of a fruit is determined by dipping the fruit in a bath of mineral oil, wiping off excess oil, drying the surface with paper, applying aluminium powder which is then brushed off with cotton wool, and finally covering the surface again with a thin, uniform layer of aluminium powder, or a mixture of aluminium and Sudan black; the oil absorbed by capillarity into the superficial intercellular spaces comes to the surface through open lenticels and appears as small marks in the layer of powder. During the ripening of Williams' pears open lenticels are numerous while the fruit is green, but become very few as it turns yellow; in overripe, brown fruit open lenticels are again numerous.

Spraying for cultural purposes.

(*See also* 53, 260e.)

197. Bömeke, H.
Über den Stand der Hormonanwendung im Obstbaugebiet der Niederelbe. **(The use of hormones in the Lower Elbe fruit district.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author describes how growth substances are used to achieve particular purposes: (1) to break biennial bearing by thinning fruitlets with α-naphthylacetic acid, (2) to prevent premature fruit fall with the same substance, and (3) to defoliate nursery stock in early autumn with disodium-3,6-endoxohexahydrophthalate.—Obstbauversuchsanst., Jork.

198. Hoffman, M. B., Edgerton, L. J., and Fisher, E. G.
Comparison of naphthaleneacetic acid and naphthaleneacetamide for thinning apples.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 63-70, bibl. 8.

From a review of the literature and from the results of trials carried out during 1951-54 it is concluded that the amide is more moderate in its thinning effect than the acid, in spite of the fact that higher concentrations are required. The amide does not produce the formative effects on young apple foliage that are usually characteristic of the acid. This permits use of the amide at bloom or an early stage petalfall stage. Such early application appears necessary with summer apples if premature ripening is to be avoided, and for control of biennial bearing.—Cornell Univ. [See also *H.A.*, 25: 1330.]

199. Ōgaki, C., and Tatsuno, Y.
Thinning peaches with hormone sprays.
[Japanese, with English summary ⅓ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 45-54, bibl. 22, illus.

Na-NAA was sprayed on vigorous 5-year-old peach trees at 20, 40 and 60 p.p.m. 5, 10, 20, 30 and 40 days after full bloom. The best results were given by concentrations of 60 and 20 p.p.m. applied 20 and 30 days respectively after full bloom.

200. Hatton, T. T.
Responses of the Delicious apple to sprays of 2,4,5-trichlorophenoxyacetic acid.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 59-62, bibl. 6.

The following observations were made on the effects of 2,4,5-T sprays on Delicious: (1) Unsprayed fruit which was allowed to reach comparable maturity eventually developed as much red colour as did sprayed fruit harvested earlier. (2) Sprayed fruit, harvested before it became post-mature, stored as well as unsprayed fruit. (3) Earlier colouring of fruit as a result of 2,4,5-T sprays was always accompanied by earlier maturity. (4) Earlier colouring and maturity without foliage injury was obtained by using a concentration of 50 p.p.m. (5) A satisfactory date for application appeared to be approximately 130 days after full bloom. (6) The later the spray is applied, the lower is the concentration required to colour and mature the fruit. It is concluded that 2,4,5-T has greater commercial value as a spray to prevent pre-harvest drop and to induce early maturity than as a spray to improve fruit colour.—Wash. St. Coll., Pullman.

201. Abbott, D. L.
2:4:5-TP as a fruit-ripening agent: II. Apple var. Worcester Pearmain.
A.R. Long Ashton agric hort. Res. Stat. for 1954, 1955, pp. 47-51, bibl. 11, illus.

Considerable injury was observed in 1954 on trees of Worcester Pearmain sprayed with 2:4:5-TP in 1953. Foliage and blossom were so reduced that trees sprayed on 15 July yielded approximately 75% of the control crop and those sprayed on 4 August yielded only 25%. Application of 2:4:5-TP at 40 p.p.m. on 30 July 1954 again hastened fruit maturity and made possible the harvest of good quality ripe apples 16 days before the normal picking date [see *H.A.*, 25: 165]. The local application of 2:4:5-TP has shown it to be effective as a fruit-ripening agent when sprayed on the leaves rather than on the fruit. [Author's summary.]

202. Poma Treccani, C., and Bertoli, P.
Influenza dell'acido alfa-naftalenacetico sulla caduta prematura e sulla maturazione delle pere Buona Cristiana Williams. **(Effect of alpha-naphthaleneacetic acid on pre-harvest drop and maturation of Williams' pears.)** [English summary ½ p.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 326-43, bibl. 13.

Williams', the most common pear variety in Italy, is subject to preharvest drop. Twenty-year-old trees were sprayed with α-NAA at 10 p.p.m. and 20·1 per tree in early August when preharvest drop began, and in some cases again 10 days later. The stop-drop effect showed within 3 days and was strongly evident for 10-11 days. Fruit drop in the treated trees was 4·5-11·0% compared with 20-34% in the controls. On picking, there was little difference in maturity between treated and untreated fruits, but the former were distinctly the riper after storage at 1-3° C. for 7-8 weeks. Treatment slightly improved the organoleptic quality of fruit held at 10-20° C. after cold storage.

203. Crane, J. C.
Preharvest drop, size and maturity of apricots as affected by 2,4,5-trichlorophenoxyacetic acid.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 75-84, bibl. 14.

Spray applications, in 1953, of the tri-ethyl amine salt of 2,4,5-T at concentrations of 25 and 50 p.p.m. to the Tilton apricot at the initiation of pit hardening, reduced preharvest fruit drop to 6·6 and 6·4% of the total crop, respectively, as compared to 52·9% drop from the unsprayed trees. In addition, the spray treatments increased rate of fruit growth as well as size so that at commercial harvest average increases in fruit diameter and fresh weight of 10·1 and 21·2%, respectively, were obtained with the 50 p.p.m. concentration. Fruit maturity was also hastened by from 1 to 2 weeks. The same concentrations applied about 40 days after the beginning of pit hardening were much less effective in controlling fruit drop and in altering fruit size and maturity. The Stewart apricot is characterized by fruit drop that is the result of seed abortion. Applications of 25, 50 and 100 p.p.m. of 2,4,5-T, in 1954, at the initiation of pit hardening reduced fruit drop to 1·2, 0·8, and 0·6% of the total crop, respectively, as compared to a 9% drop from the unsprayed trees. At commercial harvest, increases in average fruit diameter and fresh weight of as much as 9·3 and 33·8% respectively, were obtained with the 100 p.p.m. concentration. Fruit maturity was hastened by from 3 to 6 days. The relationship between time of application and concentration of 2,4,5-T to the responses obtained are discussed. [Author's summary—for earlier work see *H.A.*, 23: 246 and 24: 185.]—Univ. Calif., Davis.

204. KEMP, W. S., AND WILSON, D. W.
Effects of hormones on apricots. Experiments in hastening maturity.
Orchard, N.Z., 1955, **28**(8): 2-5, bibl. 3.

Several concentrations of 3 formulations of 2,4,5-T were applied to Newcastle apricots at the start of pit hardening. Picking from treated trees started 3-7 days earlier than from untreated trees, and fruit size was increased by up to 30%. There was some foliage damage especially at higher concentrations, and 50 p.p.m. is recommended as the safest concentration to give maximum effect. Thinning before spraying is advised. Some preliminary work on inducing maturity of frost-damaged apricots has shown that 2,4,5-T would only be successful when the frosts occurred about the time of or following the start of pit hardening.

205. CRANDALL, P. C.
Relation of preharvest sprays of maleic hydrazide to the storage life of Delicious apples.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 71-4, bibl. 5.

In experiments carried out over 2 years, maleic hydrazide sprays applied to Delicious 4 weeks before picking significantly increased the firmness of the flesh at harvest compared with that of fruit sprayed 1 week before harvest. After 3 months' storage there was no significant difference in firmness. Concentrations of 150, 300 or 450 p.p.m. MH did not extend the storage life of the fruit. A concentration of 450 p.p.m. applied 4 weeks before harvest had a slight adverse effect on fruit flavour, detectable at the end of the storage period. MH had no apparent residual effect on the trees at any of the concentrations used.—St. Coll. Wash., Pullman.

Nutrition, soil management and irrigation.

(*See also* 260s, 1256.)

206. HINTZE, S.
Gödslingsförsök med äppleträd vid Rånna 1938-1950. **(Manurial trials with apples at Rånna 1938-50.)**
Sver. pomol. Fören. Årsskr., 1954, 1955, 44: 150-3.

Manurial trials were carried out with five varieties of apple worked on M.IX, but results from two varieties only could be evaluated. The soil reaction was about neutral, P content was low but K content was adequate. In spite of this the yield data show increases from applications of N (300 kg/ha sulphate of ammonia) and K (600 kg./ha of 40% potassium) but no effect of P (100 kg./ha of superphosphate). Data on tree growth are also tabulated. Fruit size appeared to be correlated with yields in that fruits of the highest weight were produced by the more heavily cropping trees.

207. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA.
Fruit investigations.
A.R.C.S.I.R.O., 1954, 1954, pp. 23-4.

Apple fruit physiology in relation to storage disorders. In trials on the effect of manurial treatment on cell size and physiology in relation to keeping quality: (1) The response in N content of Jonathans to spring application of N as urea sprays alone or with P and K was negligible but summer application resulted in a substantial response and a colour decline. (2) The increased N content consisted partly of insoluble N, but the increased insoluble N per cell did not increase the respiration rate per cell and if the increased N was all protein the respiration per unit protein fell. (3) K and P additions did not affect the level of N absorption or the protein: soluble N balance. (4) Adding growth substances to the sprays applied during the period of cell division increased the cell number per fruit relative to fruit size and gave a reduction in disorder relative to fruit size. (6) A positive correlation exists between mean fruit size per tree and mean cell size in a fixed fruit-size group. *Gas storage.* 3-5% oxygen without carbon dioxide gave good results with many apple varieties. *Cell number.* In investigations to discover reasons for the wide variation in fruit cell number within and between apple trees: (1) No correlation was found between time of pollination and cell number in developed Granny Smiths. (2) Jonathans on single blossom clusters showed variation in cell number and fruit weight. (3) Rootstocks M.XII, M.XVI and Spy gave the same cell number in Granny Smiths. (4) On 1-year-old laterals terminal bud fruits were larger than, but had the same cell number as, lateral bud fruits. (5) Cell numbers were similar in Jonathans from vigorous and stunted trees, the difference in fruit size being due to difference in cell volume. (6) Cell number was affected by Zn deficiency but not by mild mosaic, canker or B deficiency. *Nematode studies.* Root-lesion nematode population in a plot from which infested apple trees had been removed remained high when the plot was cropped with tomatoes or allowed to revert to volunteer vegetation, but fell considerably when it was sawdust-mulched for 9 months to suppress plant growth.

208. LECRENIER, A., DERMINE, E., AND TRZCINSKI, T.
Étude de la relation entre la fumure, la croissance et la composition chimique des feuilles et du bois chez le pommier. **(The relation between nutrition, growth and chemical composition of leaves and wood in the apple tree.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The effects of the addition of 27 combinations of 3 different amounts of N, P and K were studied over a period of 3 years on a Malling II apple rootstock growing in a mixture of sand and soil or pure sand in pots. Observations were made on leaf area, length of branches, diameter of branches, weight of wood etc.

Correlations were sought between different growth aspects and the chemical composition of leaves and wood with regard to N, P, K, Mg, Ca and Fe.—Stat. Rech. Gembloux, Belgium.

209. Kwong, S. S.
The relationship between soil analysis and cultural practices of a peach orchard.
Diss. Abstr., 1955, **15**: 929-30, being *Publ.* 8503 of 96 pp.

A study of the nutritional status of the soil as influenced by mulching and fertilizer applications was carried out on a Michigan peach orchard. Under mulch with fertilizer, exchangeable Ca was lower than in unmulched plots, while the per cent Ca saturation increased with depth. When no fertilizer was applied, mulched plots showed higher exchangeable Mg than unmulched; the per cent Mg saturation under mulch with fertilizer was lower than in unmulched samples. Exchangeable K was higher under mulch at 0-12 inches deep than at other soil depths with fertilizer. A higher cation exchange capacity was found at all soil depths under mulch than in the unmulched samples, when no fertilizer was applied. There was an increase in acetate-soluble P at 0-4 inches under mulch with fertilizer. Under these conditions the pH of the surface soil was also increased. There was a significant correlation of pH with per cent Mg saturation, and a highly significant correlation of pH with per cent Ca saturation, and with total per cent saturation with Ca, Mg and K. A negative correlation of pH with acetate-soluble P was also found to be highly significant.

210. Dalbro, S.
Leaching of apple-foliage by rain.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

In rain water collected under 35-year-old apple trees the content of K, Na, Ca and organic substances has been determined. Details are given of amounts deposited per year and per hectare of tree-covered area and the consequence of leaching is discussed mainly in relation to soil conditions, foliar analysis and tree and fruit growth.—State exp. Stat. Blangstedgaard, Denmark.

211. Johansson, E., and Rootsi, N.
Kvävetillförsel till frukträd genom besprutning med urinämne. (**Nitrogen manuring of fruit trees by foliar applications of urea.**) [English summary, 5 lines.]
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 68-77, bibl. 9, illus.

Three foliar post-blossom applications of 1% urea did not cause any damage to apple and pear, but in most of the varieties tested ripening in storage was somewhat delayed. The nitrogen content of the leaves and the size of the fruit were increased as a result of the treatment. The trials were carried out at Alnarp in 1953 and 1954.

212. Knickmann, E.
Die Phosphatversorgung der Obstbäume. **(The supply of phosphate to fruit trees.)**
Tellus-Verlag, Essen, 1955, pp. 80, bibl. 130, illus.

From a review of the literature and his own observations the author comes to the conclusion that by drawing on the phosphate reserves of the soil fruit trees may thrive for some time in the absence of P_2O_5 applications. Good husbandry, however, demands that at least the amount of P_2O_5 annually withdrawn from the soil—about 25 kg/hectare in the case of bearing trees—should be regularly restored. In order to supply 25 kg of available phosphate to the roots it is necessary to apply 75 kg P_2O_5 or about 400-500 kg of a commercial phosphorus fertilizer every year. The booklet, which is well illustrated—partly in colour—is published by the Agricultural Research Station of the Thomas Phosphate Producers at Essen—Bredeny. [For a shorter survey see *H.A.*, 25: 2516.]

213. Stanković, D., and Bećarević, A.
A contribution to the study of phosphorus metabolism in healthy and diseased fruit trees, determined by radioactive phosphorus (P^{32}).
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Tissues examined included those of apple, pear, plum, quince, peach, apricot and sweet cherry trees, some healthy, some diseased. In healthy trees the distribution of P varies according to organs, vigour, age of branches, etc. Leaf accumulation is considerably affected by the incidence of particular named diseases.—Fac. Agriculture, Belgrade. [See also *H.A.*, 25: 1454.]

214. Fisher, E. G., and Walker, D. R.
The apparent absorption of phosphorus and magnesium from sprays applied to the lower surface of McIntosh apple leaves.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 17-24, bibl. 8.

Young leaves absorbed P faster than old leaves. The compound used as source of the element greatly affected the rate of absorption, which was most rapid from H_3PO_4, slightly slower from $NH_4H_2PO_4$ and KH_2PO_4, and slowest from $MgH_4(PO_4)_2$. Among the Mg compounds tested, the rate of absorption was most rapid from $Mg(NO_3)_26H_2O$ and $MgCl_26H_2O$, slightly slower from $(CH_3COO)_2MgXH_2O$, and slowest from $MgSO_47H_2O$ and $MgH_4(PO_4)_2$. The use of glycerine in the spray solution increased P absorption but had little effect on Mg absorption. The use of Triton X100 as a spreading agent increased P absorption but decreased Mg absorption. $MgSO_47H_2O$ was effective in safening urea sprays since it reduced urea absorption, although urea had no effect on Mg absorption. No effect was observed of urea, ethylenediaminetetraacetic acid, formamide or methyl cellosolve on P absorption except where the concentrations were strong enough to cause leaf injury. Similarly no effect was observed of methyl cellosolve, carbowax, naphthaleneacetic acid, 2,4-dichloroanisole, methyl urea or K_2SO_4 on Mg absorption.—Cornell Univ.

215. Cain, J. C.
The effect of potassium and magnesium on the absorption of nutrients by apple trees in sand culture.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 25-31, bibl. 6.

Data are presented showing the rate of absorption of K and Mg by apple trees from nutrient solutions containing low and high levels of these nutrients in factorial combination throughout a growing period of 118 days.

Parallel data show concurrent leaf tissue concentrations of these nutrients. The evidence indicates that neither K nor Mg influences the rate of absorption of the other; a high level of supply of either may, however, result in a lower tissue concentration of the other. It is postulated that these effects are associated with growth and transport phenomena and are possibly related to the specific function of these nutrients in the plant. When used in equivalent concentrations, the effect of K in reducing the leaf concentration of magnesium is much greater than that of Mg in reducing leaf concentration of potassium. [From author's summary.]—N.Y. agric. Exp. Stat., Geneva.

216. PIENIĄZEK, S. A., AND UNRUH, M.
Studies on soil cultivation in the young apple orchard.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Ten different soil management systems were replicated 10 times, the 8-tree blocks being arranged by the Latin Square method in an orchard planted in 1947. All trees were interplanted with potatoes, vegetables or summer legume mixtures in 1951 when the differential treatments were started. The most promising results were achieved on the plots where 2 m. strips of permanent sod were established. The soil between the strips was easily cultivated by tractor and no hand cultivation was necessary.—Inst. Pomology, Skierniewice, Poland.

217. SADAMORI, S., AND OTHERS.
Studies on sod culture of orchards. II. Effect of successive cutting of grass on conservation of soil moisture and available nitrogen. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **24**: 33-40, bibl, 14, illus.

Two-year-old blocks of orchard grass and Ladino clover were studied, and the effect of cutting on soil moisture and available N was observed. Frequent mowing (6 times between mid-May and the beginning of September) improved soil moisture conservation both in the surface and the deep layers; infrequent mowing increased moisture only in the surface layers, while deeper layers remained as dry as in the unmown soil blocks. Frequent mowing reduced root growth so that the soil moisture consumption of the sod was reduced. Soil moisture reduction was observed earlier in the season in grass than in clover; the effect of mowing was more marked in grass than in clover. The effect of mowing on the conservation of available soil N was less than that on soil moisture. Available N in the soil increased about 10 days after cutting.

218. HIGDON, R. J.
Soil moisture depletion by various grasses and legumes used as orchard sods.
Diss. Abstr., 1955, **15**: 928, being *Publ.* 12142 of 121 pp.

The effects of mowing were studied on white dutch clover, ladino clover, timothy, redtop, quackgrass, bluegrass and fescue, which were grown on plots on Miami silt loam. The intensity and distribution of rainfall in relation to time of mowing appeared to have marked effects on soil moisture depletion by the sod covers. Mowing of grasses during periods of deficient soil moisture appeared to conserve soil moisture, but the effect was only temporary and later in the season mown sods were imbibing more soil moisture than unmown sods. Mowing when there was no lack of soil moisture tended to increase its depletion. Bluegrass, fescue, timothy and redtop sod covers resulted in less depletion of soil moisture than those of ladino clover, white dutch clover, alfalfa and quackgrass.

219. PASSECKER, F., AND KIELHAUSER, G.
Bodenuntersuchungen an Kirschenstandorten in Tirol und Vorarlberg. **(Studies of cherry soils in the Tyrol and Vorarlberg, Austria.)** [English, French, Spanish summaries, 6 lines each.]
Mitt. Klosterneuburg Ser. B, 1955, **5**: 237-43, bibl. 9.

The popular belief that cherries prefer chalk soils was not confirmed. On the contrary, all good cherry orchards were found on soils with a low calcium content. Of the calcium compounds encountered $CaCo_3$ had the most unfavourable effect on the trees.

220. HORTH, C. J.
Orchard drainage.
Leafl. N.S.W. Dep. Agric., 1955, pp. 23, bibl. 3, illus.

In orchards and vineyards in New South Wales two soil conditions necessitate drainage, namely, waterlogging of a light surface soil over an impermeable or slowly permeable clay subsoil without injurious concentrations of soluble salts in the surface soil; and waterlogging to a depth of 6 feet or more with injurious amounts of soluble salts. The second condition results in yield reduction and may lead to tree or vine death. These conditions occur particularly in the irrigated soils of the Murray and Murrumbidgee. The size of the drainage tile to be used must be sufficient for the expected volume of effluent without overloading the mains, and adequate fall must be provided to ensure self-cleaning. Depth and spacing of the tiles is determined by the position of the impervious layer. On coastal sands overlying an impervious clay subsoil the location of the subsoil is the key to the problem. Some examples are given of plotting a subsoil contour plan from a survey of the surface soil. Trenching is generally done by hand, and this operation and laying are illustrated. Costs are considered.

221. GORIN, T. I.
Irrigation of fruit trees in relation to phases of their growth and development. [Russian.]
Sad i Ogorod, 1955, No. 8, pp. 42-6.

The roots of fruit trees under adequate soil moisture conditions, i.e. 70-80% of field capacity, are shown to grow throughout the growing season. To maintain the required soil moisture in the southern irrigated fruit growing areas irrigation should begin in the autumn to build up reserves. When winter rainfall is low the first spring irrigation should be applied 10-12 days before blossoming. Application to dry soil during blossoming causes flower drop. Applications at the time of vigorous shoot growth (May-June), fruit drop (June) and bud initiation and active fruit growth (July) are essential for reasons explained. The last application should be made after the harvest of the early varieties and before the maturation of the late varieties (August) to enable the trees to complete their growth cycle.

222. SEMENENKO, I. F., SOBOLEVA, I. M., AND PELJTIHIN, S. V.
The use of colliery water for orchard irrigation. (Russian.)
Sad i Ogorod, 1955, No. 8, pp. 46-8.

An apple and pear orchard in the Donbas was successfully irrigated with water of suitably low salinity from collieries. Three applications per season were made totalling 1,800-2,000 cu.m. of water per ha, which is considered insufficient. No appreciable increase in the soluble salt content of the soil was observed, the flavour of the fruit was unaffected, and yields were considerably greater than those from the non-irrigated orchards in the district. It is considered that twice the quoted amount of water applied in 5-6 treatments would give more satisfactory results, and, if summer supplies of water were insufficient, above ground storage of winter pumpings should be instituted.

Harvesting, grading and packing.

(*See also* 5, 117j, 118k, 260 b.)

223. CLAYPOOL, L. L., AND KILBUCK, J.
Quality of dried French prunes.
Calif. Agric., 1955, **9**(8): 13-14.

Fruit maturity at harvest is one of the important factors in dried fruit quality, but dehydrator requirements make it uneconomical to pick all prunes at peak maturity. In a study undertaken to find the most satisfactory stage of maturity for beginning the prune harvest in California, the following conclusions were reached. Where several weeks are required for the harvest, best results may be expected if picking begins about one week after the disappearance of chlorophyll from the flesh and the skin. Firmness of the flesh (3-5 lb.) may be used as an aid to the colour index, but the soluble solids content (24% if the crop is normal) proved a more reliable method of assessing maturity than pressure.

224. BOTTING, G. W., AND STEED, J. N.
Bulk handling of fresh fruit.
J. Dep. Agric. S. Aust., 1955, **59**: 16-22, illus.

Bulk handling of a commercial apple crop is described. The system involves emptying the picking bags into large containers mounted on trailers for transport to the packing shed. There the fruit is emptied onto a slow-moving conveyor belt feeding the grader. Experience in an experimental orchard has been obtained with trailer-mounted bulk boxes, and on mechanical transfer of the boxes from trailer to transport truck.

225. JORGENSEN, C. J. C.
Damage to Colorado Elberta peaches during harvest.
Tech. Bull. Colo. agric. Exp. Stat., **56**, 1955, pp. 32, bibl. 15.

Pre-shipment damage to Elberta peaches was studied and compared in 2 types of container. Damage caused by bruising and punctures varied greatly during the years of the study. Damage in the field to bushel-packed peaches was high, and increased significantly during the passage through the fruit shed. The occurrence of damage to boxed fruit was more difficult to determine exactly. Boxed fruit had greater percentages of undamaged fruit than fruit packed in bushels both at shed and shipping dock.

226. STENDER, J. A.
Fruit grading.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author considers in detail what a fruit grower should really look for when choosing a grader, already knowing that the main points to examine are: the construction of the grader, the accuracy of its grading, the possible damage to fruit, the throughput, and costs. —Inst. hort. Engng, Wageningen.

227. MINISTRY OF AGRICULTURE, LONDON.
Apple grading and packing.
Bull. Minist. Agric. Lond., **84**, revised, 1955, pp. 76, illus., 4s. 6d.

As might be expected, there are many differences between this 3rd edition and the 2nd edition published 19 years ago. The sections on thinning and picking have been omitted and a number of new sections have been inserted. The contents are: (1) Production and economic factors. (2) Packing houses: layout. (3) Packing house equipment: conveyors; sizing and packing equipment. (4) Organizing the work: grading and packing; long-period storage. (5) Packages and materials. (6) Grading: quality; defects; official quality grades; quality grading; size grading. (7) Wrapping and packing. There are 5 appendices on suggested records forms, grades, specifications of containers, tables of counts for diagonal packs and data relating to weights in B.S.A. [British Standard Apple or Oregon] boxes.

228. ULRICH, R.
La physiologie des fruits en emballage.
(The physiology of packaged fruits.)
Fruits d'Outre Mer, 1955, **10**: 369-77, bibl. 34, illus.

The effects of the 4 characteristics of packages that influence the physiology of fruit are reviewed. These are: (1) Mechanical characteristics. (2) Thermal conductivity. (3) Permeability to gases: the disadvantages of lack of oxygen and of the accumulation of volatiles, organic products and water vapour; gaseous exchange through the packing material; plastic wraps. (4) Chemical composition: oiled and antiseptic paper wraps.

Storage.

(*See also* 260v, y.)

229. NELSON, S. H., AND PHILLIPS, W. R.
The influence of stem builders on apple storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 1.

In one series of experiments it was found that fruit borne on scions worked on Hibernal stem-builder developed considerably more core flush towards the end of the storage period than that on scions on Antonovka stem-builder (both on Anis rootstock), while the use of *Malus baccata* as stem-builder gave intermediate results. In another series, using Antonovka as rootstock, the best storage behaviour was obtained with Robin as stem-builder and the poorest with Hardy

Crab. Pioneer, Columbia and Osman had intermediate effects. Core flush was the limiting factor to storage in most samples.—Centr. exp. Fm. Ottawa. [See also *H.A.*, 24: 3529.]

230. Phillips, W. R., and Poapst, P. A.
The effect of precooling on the storage behaviour of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, pp. 2-3.

The effect of 4 rates of cooling on 3 varieties of apple (Cortland, Lobo and McIntosh) were observed during the subsequent storage period. A reduction in temperature of apple tissue from 60° to 40° F. was obtained by (1) water immersion in 2¼ hours, (2) forced air in 10 hours, (3) still air in 17¼ hours, and (4) insulated package in 65 hours. In all 3 varieties the amount of fungal wastage was significantly higher in water precooling than in air. In Lobo the amount of deep scald was increased by water pre-cooling. Observations made after 5 months' storage showed that treatment 2 caused less fungal waste than treatments 3 or 4. Treatment 2 also resulted in improved texture and flavour. After 3 months' storage there was less core flush in McIntosh apples cooled quickly (treatments 1 and 2), but 2 months later treatment 1 showed more core flush than any of the others. Rapid cooling reduced the amount of senile breakdown in McIntosh. Shrivelling caused by moisture loss was reduced by increased rate of cooling. —Centr. exp. Fm., Ottawa.

231. Porritt, S. W.
The physiological condition of apples entering storage.
Abstr. in *Rep. Canada Cttee Fruit Veg. Pres. for 1954*, p. 4.

The time of onset of the climacteric respiratory rise in apple is of primary concern in a consideration of possible stimulation of ripening by apple volatiles in storage. Stage of ripeness of commercially harvested apples was determined from respiration measurements made on samples of fruit taken from lots arriving daily at the packing houses. Results, similar to those of the previous year (see *H.A.*, 24: 3519], showed that of 53 samples 24 were pre-climacteric, 13 were post-climacteric and 16 were considered to have begun the climacteric prior to the time of sampling.—Exp. Fm, Summerland, B.C.

232. Nyhlén, Å., and Castberg, C.
Fruktlagringsundersökningar vid Sveriges Pomologiska Förenings lagringstävlingar 1944-52. (**Fruit storage studies of the Swedish Pomological Society 1944-52.**)
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 5-30.

In the autumn of 1944 the Swedish Pomological Society initiated an annual apple storage competition at Nynäshamn to stimulate the interest of growers and to study the factors affecting storage life under Swedish conditions. Tabulated data and graphs summarize the results of progress reports. So far, *Gloeosporium* rot emerges clearly as the most important single factor limiting the storage life of the chief varieties tested, Cox's Orange, Cox's Pomona and Ribston, and of most of the other varieties.

233. Phillips, W. R., Poapst, P. A., and Rheaume, B. J.
The effect of temperature near 32 degrees F. on the storage behaviour of McIntosh apples.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 214-22, bibl. 11.

Maximum eating quality based on flavour and texture was reached after approximately three months' storage at 36° F. Reducing temperatures to as low as 30° F. had little influence on the occurrence of this state. This phase was characterized by maximum ethylene content, slowing down of soluble pectin accumulations, maximum chlorophyll content, possible peak of CO_2 fixation rates, levelling of pressure test trends and stabilization of extractable juice values. This phase was followed by quality loss. [From a authors' summary.]—Canada Dep. Agric., Ottawa.

234. Porritt, S. W.
The effect of apple volatiles on respiration and ripening of preclimacteric McIntosh held at 32° and 36° F.
Abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, pp. 8-9.

Pre-climacteric McIntosh apples, held at 32° and 36° F., were subjected to volatiles from ripe McIntosh, while control fruits were aerated with fresh air. The control fruit held at 32° F. was shown to be in a post-climacteric condition by 6 November, but no climacteric rise was distinguishable in the respiratory pattern of either the volatile-treated or control apples at either temperature. There appeared to be a slight increase in CO_2 production by the volatile-treated fruit after the middle of November. Examination of apples in January failed to show any conclusive differences in flesh firmness, core flush or eating quality between volatile-treated and control apples.—Exp. Fm, Summerland, B.C.

235. Porritt, S. W., and Edge, E. D.
Volatile content of air in commercial apple storages.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 8.

Concentrations of ethylene and volatiles other than ethylene were determined by regular analyses of the storage atmosphere in 2 commercial apple stores. Results showed that low values for both volatile fractions prevailed throughout the storage season. Ethylene concentrations ranged from 0·057 to 0·268 mg. per cu. ft., with a mean of 0·120 mg. per cu. ft. for the storage period.

236. Ryall, A. L., and Uota, M.
Effects of sealed polyethylene box liners on the storage life of Watsonville Yellow Newtown apples.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 203-10, bibl. 11.

A relatively high storage temperature (about 42° F.) is required to control internal browning in Yellow Newtown apples, but this temperature allows excessively rapid ripening. A study was made to determine whether the storage life at relatively high temperatures could be extended by the use of sealed polyethylene box liners. In boxes with polyethylene (150 gauge) liners held at 40° F., CO_2 and O_2 remained fairly constant at levels of about 4·5 and 6% respectively from the 5th to the 26th week of storage. At 31° F. CO_2 increased and O_2 decreased continuously during storage to final levels of 6·5 and 2·6%, respectively. All apples stored at 31° F. were affected by internal browning whereas the disorder was not serious in any of the lots stored at 40° F. Apples stored in sealed polyethylene (150 gauge) liners at 40° F. remained greener and firmer and developed less scald than those stored at the same temperature in lighter (100 gauge) film liners or those stored without film liners. There was no indication that storage in sealed film liners increased decay. Oiled wraps reduced scald development at 31° F., but had no effect on the incidence of scald at 40° F.—U.S. hort. Field Stat., Fresno, Calif.

237. Boyes, W. W.
Can the storage life of deciduous fruits be lengthened by the use of polyethylene?
Decid. Fruit. Gr, 1955, **5**: 160-3, bibl. 1, illus.

In cold storage tests polyethylene wrappers or box-liners were found to be unsuitable for use with apricots, peaches or plums, inducing gel-breakdown, abnormal ripening with severe woolliness, and physiological breakdown respectively. [See also *H.A.*, 25: 2510.] Very promising results were obtained by packing apples in boxes lined with polyethylene. After 4 to 6 months' storage the apples were fresh-looking and had lost little weight compared with the controls. The indications are that pears in cold storage would also benefit by being packed in boxes lined with the material. The use of polyethylene box liners practically eliminated the unsightly drying of the stalks normally found in South African grapes on the United Kingdom market. [From the author's summary.]—W.P. Fruit Res. Stat., Stellenbosch.

238. Smock, R. M.
A new method of scald control.
Amer. Fruit Gr, 1955, **75**(11): 20.

In experiments in 1954-55 a dip treatment of diphenylamine plus a wetting agent after harvest gave better scald control than oiled paper. The best concentration was 1000 p.p.m. With Cortlands there was 78% scald on the controls, 8% with oiled wraps, and 1% with diphenylamine at 1000 p.p.m. With Greenings a concentration as low as 200 p.p.m. did not completely control the scald. Australian experiments confirmed these results.—Cornell Univ.

239. Phillips, W. R., and Poapst, P. A.
Breakdown in Lobo apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 5.

Lobo apples were harvested at 3 different dates and stored at temperatures ranging from 30° to 39° F. in an attempt to determine the relationship between maturity and temperature on the one hand and deep scald and internal breakdown on the other. There was only a slight tendency for deep scald to develop at 30° F. and the disorder did not occur at higher temperatures. All deep scald was confined to fruit picked at the 2 later stages of maturity. Breakdown increased with storage temperature and was more prevalent in fruit from the earlier than the later harvests.—Centr. exp. Fm, Ottawa.

240. Eaves, C. A.
Gas storage of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 6.

With McIntosh apples harvested early, the incidence of core flush was greatly reduced by storing in 7% CO_2 and 14% O_2. The later picked fruit had the better keeping quality. Gas storage resulted in a striking reduction in percentage rots. Red Delicious, Northern Spy and Red Rome Beauty stored in 5% CO_2 and 5% O_2 kept well under cellar storage conditions until the end of May, but after 2 weeks in air Delicious showed slight core browning. Lenticel scald in Red Rome Beauty, which develops in normal storage, was completely controlled by low O_2 storage. Wagener showed only slight scald in gas storage, but there was more serious breakdown of fruit affected with water-core in gas than in air storage.—Exp. Fm, Kentville, N.S. [See also *H.A.*, 24: 3522.]

241. Louis, A.
Conservation des fruits et pertes de poids.
(Fruit storage and weight loss.)
Ann. Soc. nat. Hort. France, 1955, **1**: 43.

Normal storage losses of healthy apples and pears were studied in 3 types of store: (1) a standard fruit store (9-10° C., R.H. 70-75%); (ii) a refrigerated store (0·5–1·0° C., R.H. 80-85%); (iii) a Krebser refrigerated store (4-5° C., R.H. 90-95%). Weight losses are tabulated for 6 apple and pear varieties after varying periods of storage.—École nat. Hort., Versailles.

242. Fisher, D. V., and Porritt, S. W.
Some recent studies in late harvesting and delayed cold storage of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 223-30, bibl. 8.

Bartlett pears harvested 1 and 2 weeks beyond date of commercial harvest at pressures from 16·0 to 13·5 lb. ripened satisfactorily and with good quality for both eating and canning after 6 weeks at 31 to 32° F. Keeping quality of the fruit as measured by length of time for core breakdown to develop after removal of pears to the ripening room indicated that lengthening the period of cold storage decreased storage life to a greater degree than increasing the maturity at harvest. For the first and second weeks after harvest Bartlett pears increased in weight 20·0 and 34·5% respectively. Bartlett pears harvested at optimum maturity and delayed for 24 versus 72 hours before entering 31 to 32° F. storage, after an 8-week period of storage ripened with good quality and showed no apparent differences in condition between treatments. Softening rates at 32° for fruit delayed 24 and 72 hours before being cooled were substantially similar. Following harvest, Bartlett pears held at 68° F. underwent a period of inactivity during which no softening occurred for 3 days with fruit picked at optimum maturity. With fruit picked beyond optimum maturity, however, softening commenced immediately. [Authors' summary.]—Exp. Stat., Summerland, B.C. [See also *H.A.*, 24: 3529h.]

243. Anjou, K.
Lagringsförsök med päron vid institutionen Balsgård. **(Pear storage trials at Balsgård.)**
[English summary, 7 lines.]
Sver. pomol. Fören. Årsskr, 1954, 1955, **55**: 103-17, bibl. 1.

In storage trials, carried out from 1951-52 to 1953-54 all 15 pear varieties tested were suited by temperatures of +1-3° C. for storage and of +16-21° C. for after-ripening. Best results were obtained with Conference which kept for 6 months or more. The keeping quality of all varieties in non-refrigerated, ventilated storage was poor.

244. Nicolaisen-Scupin, L.
Ein Beitrag zur Charakterisierung der Reifevorgänge an Birnen unter verschiedenen Lagerungsbedingungen. (**On the ripening of pears under different storage conditions.**) [English, French, Spanish summaries, 6 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 225-36, bibl. 18.

The ripening of two pear varieties, Comtesse de Paris and Madame Verté, was studied in refrigerated and ordinary storage, and graphs are presented on refractometer readings, total acid content, dry matter content and weight loss throughout the storage and after-ripening periods. The values obtained were compared with assessments of eating quality and it was found that the highest refractometer reading coincided with optimum ripeness, irrespective of type of storage. The time at which the fruits were removed from storage significantly affected after-ripening, pears kept till 10 March being of better quality and having a longer period of optimum ripeness than those kept only till 15 February. Cold storage proved greatly superior to ordinary storage.

245. Ulrich, R.
Physiologie de la maturation de la poire Passe Crassane en fonction de la température. (**Physiology of the ripening of the Passe Crassane pear in relation to temperature.**)
From summary *Pap. 14th int. hort. Congr.* 1955, Scheveningen, *see note p. 4*.

The author considers the various possibilities of ripening Passe Crassane pears kept at various combinations of 0° C., +4° C., +10° +15° C. and +18° C. with or without the application of ethylene.—Sorbonne, Paris and Stad. Froid Bellevue, France. [See also *H.A.*, 25: 1363, 3617e.]

246. Uota, M.
Effect of temperature and ethylene on evolution of carbon dioxide, ethylene and other oxidizable volatiles from three varieties of plum.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 231-43, bibl. 10.

Beauty plums, harvested at commercial picking maturity, ripened normally at 90° F. and had a higher respiration rate and produced more ethylene than at 55° or 35°. Santa Rosa plums appeared to ripen normally at 90° F. although the fruit did not colour satisfactorily; the respiration rate was higher than at 70°, 50° or 35°. Ethylene production was somewhat suppressed at 90° and approximately paralleled the respiration curve at 70°. Duarte plums did not ripen normally at 90° F., although the respiration rate was highest at that temperature. Ethylene production in Duarte was almost completely inhibited at 90°, unless the fruit was first treated with ethylene; it approximately paralleled the respiration curve at 70°. Ethylene treatment for 24 hours prior to ripening increased the rate of ripening and ethylene production of all varieties at all temperatures used except 35°. Exposure of fruit to 70° before ripening at 90° resulted in a more favourable ripening response. Volatiles including ethylene appeared to be associated with ripening.—U.S. Dep. Agric., Fresno, Calif.

247. (L. E. Lavender and Co. Ltd.)
New technique in store design.
Comm. Gr, 1955, No. 3118, pp. 729-30, illus.

A control unit has been developed which will give cheaper storage of apples between October and February. Cool night temperatures are used in cooling the fruit and removing the gases evolved. The unit is built outside the store and at night cool air is drawn into an insulated trunking by a fan; the air passes over a humidifier to a diffuser in the floor of the store which spreads it evenly beneath the stacked fruit. Air circulation is allowed during the day. The temperature of the produce can be reduced to 40° F. and held at within 5° of this. The incorporation of a refrigerating coil in the lower section of the air trunk below the fan may help in the initial reduction of the air temperature.

248. van Hiele, T., and others.
Waterdamp- en gasdichte bekleding van koelhuisruimten. (**A water vapour- and gas-proof lining for cold stores.**) [English summary 10 lines.]
Meded. Dir. Tuinb., 1955, **18**: 788-94, bibl. 2, illus.

"Bitumenweefsel", a bituminous roofing material, was found to be a satisfactory vapour- and gas-proof lining for cold stores when applied to the warm side of the insulating layer. Vinycel, a plastic material, has also shown promise but is too expensive for commercial use. In a refrigerated gas store, "Bitumenweefsel" was a most satisfactory substitute for zinc as a gas-proof lining.

249. Jones, A. H., Ferguson, W. E., and Desmarais, J. G.
A study of fungicidal paints applied to walls of a cold storage room.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 12.

Most of the brands of paints under test in apple stores contained diphenylmercury dodecenyl succinate as the active fungicidal agent. These paints showed greater fungicidal action against micro-organisms common to such storage rooms than did control paints with no additives, chlorinated rubber base paints and other miscellaneous paints. Further verification of this was seen in laboratory studies where the zone of inhibition of these micro-organisms was measured for each paint.—Sci. Serv., Ottawa.

Composition of fruit.

(*See also* 260f, 261b.)

250. Poapst, P. A., Phillips, W. R., and Ward, G. M.
Maturity studies of McIntosh apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 1, bibl. 1.

No fixed relationship has been found between starch content of apples and degree of abscission. Three years' observations show that the apparent starch loss in McIntosh apples is linear. This linearity appears to be independent of day-to-day weather conditions. Starch levels in the fruit vary appreciably from season to season, and it now appears that maturity is connected more closely with the anatomical location of the retreating starch granules than with their actual amount. —Centr. exp. Fm, and Chem. Div., Sci Serv., Ottawa.

251. Ward, G. M.
Starch changes in ripening apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 2.

The measurement of the rate of disappearance of starch in ripening apples has been used as a rapid test for estimating the stage of maturity and the correct time for harvesting. Two methods of measuring starch content have been compared. There is a great seasonal variation in the level of starch and it has not been possible to determine any specific content of starch that would indicate optimum maturity.—Sci. Serv., Ottawa.

252. Amsen, M. G.
Frugtopbevaring. (**Fruit storage.**)
Horticultura, 1955, **9**: 153-6.

Graphs illustrate the changes in sugar and soluble solids content of ripening Canada Reinette and Purple Cousinot apples from 15 November to 2 October. The problem of determining the best time for picking apples is discussed.

253. Francis, F. J., Harney, P. M., and Bulstrode, P. C.
Color and pigment changes in the flesh of McIntosh apples after removal from storage.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 211-13, bibl. 3.

The general yellowing of the flesh of McIntosh apples after removal from storage is due mainly to changes in the carotene content rather than carotenol or chlorophyll. The pre-harvest spray 2,4,5-TP did not produce a significant difference in the color, chlorophyll, carotene or carotenol content. [Authors' conclusions.] —Ont. agric. Coll., Guelph.

254. Shirley, R. L., and Blake, C. E.
Reducing capacity, potentials and water of apples.
Econ. Bot., 1955, **9**: 269-72, bibl. 3.

Apples of the York Imperial, Rome Beauty, Red Delicious and Golden Delicious varieties have been evaluated for their (*a*) capacity to reduce tetravalent cerium, (*b*) E.M.F. potentials, and (*c*) water content, as determined by toluene distillation and receiving tubes. The reducing capacity and potentials were evaluated during both growth and storage, and the water only during storage, at approximately bi-weekly intervals. The reducing capacity was greatest during growth, least during late storage and intermediate in early storage. The potentials were more positive during growth. A statistical analysis of the data indicated no significant variety or interaction influences on the reducing capacity or potentials of the apples, but that the variation in reducing capacity during growth, early and late storage was highly significant at the 0·01 level, and the difference in potentials between the growing and storage periods was significant at the 0·05 level. The variance in water content of the varieties of apples was significant at the 0·01 level. True water evaluations were shown to be significantly lower than those obtained by oven drying. [Authors' summary].—Shepherd Coll., Shepherdstown, W. Va.

255. Shewfelt, A. L., Brown, D. R., and Troop, K. D.
Composition and canning quality of crab-apple varieties.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 18.

Canning tests and analyses for ascorbic acid, total acid and soluble solids were made on 15 varieties of crab-apple harvested at 4 different dates. Ascorbic acid content varied from 2·7 mg./100 g. for Rosilda to 36·0 mg./100 g. for Elsa. Total acid content as malic ranged from 0·58% for Trail to 2·49% for Dolgo. Soluble solids content ranged from 11·3% for Rosilda to 17·6% for Elsa. There were no significant differences in ascorbic acid and total acid contents between harvests, but soluble solids increased with advancing harvest date. The variety Quality was rated most desirable for canning, while Trail, Rosilda, Robin and Dolgo were considered unsuitable. No relationship was established between canning quality and any specific chemical component.

256. Ulrich, R., and Thaler, O.
Sur la présence et les variations de quelques constituants des poires au cours de leur développement (xylose, acide quinique, proline). (**The presence and the variation of some constituents of pears in the course of their development (xylose, quinic acid, proline).**)
C.R. Acad. Sci., Paris, 1955, **240**: 1625-6, from abstr. in *Food Sci. Abstr.* 1955, **27**, No. 2405.

Chromatographic analyses showed the following constituents in Williams' pears: sucrose, glucose, fructose, and xylose; malic acid, quinic acid (especially in young fruits), citric acid, and succinic acid; aspartic acid, asparagine, alanine, glutamic acid, serine, valine, leucine, threonin, lysine (at the end of development), traces of phenyl alanine, and proline (increasing throughout development and maturation). Results obtained with Passe Crassane pears were similar, except that xylose was not found until after harvest.

257. Abdelal, A. F.
Chemical changes associated with loss of flavour of J. H. Hale peaches during storage.
Diss Abstr., 1955, **15**: 662-3, being *Publ.* 11844 of 56 pp.

Fruit quality after ripening was highest in peaches which were given a 3-day pre-storage treatment at 75° F. before storage at 31° F. Peaches stored immediately or 1 day after harvest were inferior in quality. Storage at 31° F. was better than that at 35° F., while 40° F. was the least satisfactory. During the pre-storage ripening (of 3 days) sugars and soluble solids showed a marked increase, comparable to that occurring during ripening after 1 week's storage. Little change occurred during the same period in fruit stored immediately or 1 day after harvest. Starches decreased rapidly during pre- and post-storage ripening. Soluble pectin increased at these times. The pH and titratable acidity varied inversely, the greatest change occurring during the ripening periods. The fruit softened gradually during storage, and rapidly during both ripening periods.—Univ. Mich.

258. Institut des Fruits et Agrumes Coloniaux.
Examen de pulpes d'abricots Mechmech de diverses provenances (Fabrications industrielles du Maroc). **(Examination of the pulp of Mechmech apricots from different sources. Industrial processing in Morocco.)**
Fruits et Prim., 1955, **25**: 316-17.

Includes chemical analyses of the pulps and the physical characters of the preserves manufactured from them.

259. Anet, E. F. L. J., and Reynolds, T. M.
Water-soluble constituents of fruit. II. The separation of acids on anion-exchange resins: the isolation of *l*-quinic acid from apricots.*
Ash, A. S. F., and Reynolds, T. M.
Idem. III. An examination of the sugars and polyols of apricots, peaches, pears, and apples by paper chromatography.
Anet, E. F. L. J., and Reynolds, T. M.
Idem. IV. The organic acids in peaches.
Reprinted from *Aust. J. Chem.*, 1955, **8**: 267-75, bibl. 23; 276-9, bibl. 12; 280-4, bibl. 13.

Part II. Displacement chromatography on columns of strongly basic anion-exchange resins has been used to separate, isolate, and purify some water-soluble organic acids. The order of emergence of 27 acids from these columns is recorded. Using this method pure *l*-quinic, succinic, L-malic, and citric acids were isolated from the flesh of the apricot fruit. The method was also used for the purification of hydroxy-acids. [From authors' summary.]

Part III. The sugars and polyols in 80% ethanolic extracts of apricots, peaches, pears, and apples were examined by paper chromatography using several solvents. Xylose, fructose, glucose, sucrose, sorbitol, a cyclitol (probably *meso*inositol), and one or more ketose oligosaccharides were detected in all the fruits [see *H.A.*, 25: 190.] Galactose was detected in pears and may also be present, in trace amounts, in peaches and apples. Apricots, peaches, and pears picked in several seasons were examined. [Authors' summary.]

Part IV. The acids in several varieties of peaches were separated by displacement chromatography on strongly basic anion-exchange resins. *l*-Quinic [see *H.A.*, 24: 1215], L-malic, and citric acids were the three main acids, any one of them being the predominant acid depending on the variety, season, and maturity of the fruit. Mucic acid was found in small quantity in all samples; galacturonic acid was only present in fruit picked at commercial maturity and ripened at 20° C. The effect of maturity on the three major acids was studied for one crop of Blackburn Elberta peaches; the immature fruit contained only traces of citric acid. [Authors' summary.]—C.S.I.R.O., Homebush, N.S.W.

Noted

260.

a Abramov, N. T.
A cotoneaster from the Urals as a dwarf rootstock for pears. [Russian.]
Sad i Ogorod., 1955, No. 9, p. 76, illus.
Produces earlier and better fruits than the Ussurian pear.

b Antoniani, C., and Serini, G.
Correlazione tra tenore in 2-3 butilenglicole e stato di maturazione dei prodotti frutticoli. Nota I. *Pyrus malus* Linn. **(Correlation between 2-3 butylene glycol content and stage of maturity in fruits. I. *Pyrus malus*.)** [English summary 3 lines.]
Ann. Sper. agrar., 1955, **9**: 1167-73, bibl. 12.
Correlation established in Stark Delicious apples.—Staz. sper. Fred., Milano.

c Aomori Apple Experiment Station.
Annual Report of the Aomori Apple Experiment Station for 1952, pp. 63.
In Japanese.

d Armstrong, W. C.
The Gravenstein apple.
Qd. agric. J., 1955, **80**: 317-18.
Gnarling, which causes early death, and pollination are discussed.

e Bowman, F. T.
Chemical thinning of apples.
Agric. Gaz. N.S.W., 1955, **66**: 365.
NAA safer than 2,4-D.

f Cartwright, R. A., and others.
The suspected presence of *p*-coumarylquinic acids in tea, apple and pear.
Chem. Ind. Lond., 1955, No. 34, pp. 1062-3, bibl. 4.
In tea, apple and pear leaves and in apple and pear fruits.

g Gorter, C. J.
Photoperiods of flowering in apple trees.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*
See *H.A.*, 25: 2449.

h Granhall, I.
Äppelodlingens sortproblem. **(The apple variety problem [in Sweden].)** [English summary, 7 lines.]
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 91-6.

i Hatton, T. T.
Fig culture in North Carolina.
Ext. Folder N.C. agric. Exp. Stat., **115**, 1955, 1 sheet, bibl. 5, illus.

j de Haas, P. G.
Obsterzeugung und Absatz in den USA. **Fruit production and marketing in the U.S.A.)**
Ber. Studienreisen im Rahmen der Auslandshilfe der USA,* 1955, Hft 83, pp. 159, bibl. 29, illus.

---

* For Part I see *H.A.*, 25: 2491.

* Obtainable from AID, Land- und Hauswirtschaftlicher Auswertungs- und Informationsdienst e.V., Bad Godesberg, Heerstr. 124.

k HOFVANDER, B.
Distribution av svensk frukt. **(The marketing of Swedish fruit.)**
Sver. pomol. Fören. Årsskr, 1954, 1955, **55**: 154-65.

l JONES, R. W., AND THOMPSON, L. A.
Instruments for emasculating flowers of stone fruits.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 279-82, bibl. 2, illus.

m KEDRIN, S. P.
New apple varieties for the land along the Volga. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 36-8, bibl. 1.
A description of 6 frost-resistant varieties.

n KLANG, C. A.
Mellanförädling av päron. **(Double working of pears.)**
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 97-102, bibl. 3, illus.
See *H.A.*, 23: 2548 and 3813.

o KLEIN, L. G.
Introducing the "Wellington" apple.
Fruit Var. hort. Dig., 1955, **10**: 18.
New variety introduced by N.Y. St. agric. Exp. Stat.

p KRAMER, S.
Wuchsleistung an der "Köröser Weichsel." **(Growth of the Köröser Weichsel cherry.**
Dtsch. Gartenb., 1955, **2**: 273-4, bibl. 2, illus.
A sour cherry variety, shown to grow vigorously on a light soil.

q [LANDBOUW-ECONOMISCH INSTITUUT.]
Wat kost een nieuwe aanplant? **(The cost of a new plantation?)**
Fruitteelt, 1955, **45**: 804-5.
Of apples and pears in Zeeland.

r MCDANIEL, J. C.
Hawthorns as edible fruits.
Fruit Var. hort. Dig., 1955, **10**: 23-4.
Notes on 4 *Crataegus* spp.

s MACMAHON, J. W.
Permanent cover crops in Tasmanian apple orchards.
Tasm. J. Agric., 1955, **26**: 283-6.

t MINISTRY OF AGRICULTURE, LONDON.
Winter pruning established apple and pear trees.
Adv. Leafl. Minist. Agric. Lond., **336**, amended 1955, pp. 5.

u NILSSON, F.
Fruktodlingens aktuella läge. **(The present position of fruit growing [in Sweden].)**
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 31-5.

v PHILLIPS, W. R., AND POAPST, P. A.
Gas storage for apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, pp. 5-6.
Bancroft, Lawfam and Toshkee, various gas mixtures at 32° and 39° F.

w PLOCK, H.
Über die Kurzlebigkeit der Birnensorten auf Quitte. **(On the short life of pear varieties worked on quince.)** [English, French, Spanish summaries, 3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 244-6.
Varieties classified according to frost resistance on quince.

x PRESTON, A. P.
Promise of plenty: new rootstocks from East Malling.
Agric. Rev., **1**(4): 42-6, illus.
Malling-Merton rootstocks. [See *H.A.*, 25: 1309.]

y SAID, M.
Refrigeration of fruits at Peshawar.
Agric. Pakistan, 1954, **5**: 27-32, bibl. 3.
Observations on data from recent trials with plums, peaches, pears, apples and sweet oranges.

z SCHMADLAK, J.
Fortschritte in der Züchtung vegetativ vermehrbarer Apfel-Unterlagen. Der schwedische Apfel-Unterlagenklon "A2". **(Advances in the propagation of clonal rootstocks for apples. The Swedish apple rootstock A2.)**
Dtsch. Gartenb., 1955, **2**: 248-9, bibl. 2, illus.
A review of Swedish work.

261.

a SCHMADLAK, J.
Fortschritte in der Züchtung vegetativ vermehrbarer Apfel-Unterlagen. **(Progress in breeding vegetatively propagated apple rootstocks.)**
Dtsch. Gartenb., 1955, **2**: 274-7, bibl. 5, illus.
English work on the Malling-Merton clones.

b SHEWFELT, A. L.
Pectin fractions in potatoes, peas, crab-apples and sunflower heads.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 20.

c TIHONOV, N. N., AND TOLMAČEVA, A. S.
New varieties of small fruited apples. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 41-3, illus.
Developed at Krasnojarsk in Siberia for severe climates.

d YEAGER, A. F., AND OTHERS.
Meredith—a new peach for the North.
Fruit Var. hort. Dig., 1955, **10**: 29.
Winter hardy and ripens fruit in cool summers.

SMALL FRUITS, VINES AND NUTS

Small fruits.

(*See also* 72, 326c, f-h, k, m, r, 525, 733c, 880, 881, 976.)

262. Ministry of Agriculture, London.
Cane fruits.
Bull. Minist. Agric. Lond., **156**, 1955, pp. 29, illus., 2s. 6d.

Information is given on raspberry, blackberry and hybrid berries as follows: varieties, propagation of healthy stock, site, soils, preparation, planting, cultivation, manuring, support, training, pruning, machinery, implements, picking, grading, packing, pests and diseases. [For strawberries see Bull. 95 and for other bush fruits, Bull. 4 in this series.]

263. Hopp, R., and Lamden, M. P.
Ascorbic acid content of some Vermont-grown fruits and vegetables.
Bull. Vt agric. Exp. Stat., **579**, 1955, pp. 26, bibl. 31.

This describes a 4-year study on the ascorbic acid content of blueberries, raspberries, strawberries, snap beans, broccoli, cabbage, peas, peppers, spinach, summer squash, tomatoes, muskmelons and watermelon. Variations in ascorbic acid content were apparent both within and between seasons. Distinct varietal differences were confirmed. There was some indication of a relationship between climatic requirements of a crop and its ascorbic acid content. Cool-season crops generally had high ascorbic acid values and warm-season crops values near or below the standard.

264. Kronenberg, H. G., and Doesburg, J. J.
Het vitamin-C-gehalte van zwarte besserassen vraagt meer aandacht! (**The vitamin C content of blackcurrant varieties needs more attention.**)
Fruitteelt, 1955, **45**: 869.

Of the varieties tested Goliath had the lowest vitamin C content. High values were obtained for Baldwin and allied varieties. Contents varied with year and time of harvesting.

265. Brightwell, W. T. and others.
Observations on breeding blueberries for the Southeast.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 274-8.

The rabbiteye blueberry is well adapted to the Southeast U.S.A. and shows more promise for that region than any of the other blueberries tested to date. Ethel has been an excellent parent, especially in combination with Callaway and Clara; Hagood and Owen have not produced outstanding progenies from the crosses tested. Fruit colour inheritance in the rabbiteye blueberry is governed by multiple factors. Black Giant and Ethel in various combinations have produced large-fruited progenies. [From authors' conclusion.]—Ga Coastal Plain Exp. Stat., Tifton, and Plant Industry Stat., Beltsville, Md.

266. Rake, B. A.
The propagation of gooseberries: II. The influence of basal wounding and size of shoot on the rooting of hardwood cuttings.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 63-8, bibl. 8.

An experiment to test the effect of 4 different lengths and 4 wounding treatments on the rooting of hardwood cuttings of 3 varieties of gooseberries is described. Cuttings prepared with Rolcut secateurs rooted just as satisfactorily as those prepared with a knife. Neither splitting nor hammering the base of the cuttings before insertion improved rooting. Cuttings between 9 in. and 15 in. in length rooted well; the highest number of vigorous plants was obtained from cuttings 12 in. in length. [Author's summary.] [For part I see *H.A.*, 25: 218.]

267. Bauer, R.
Problems of disease resistance in *Ribes* L. and its overcoming by intra- and interspecies combinations.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

An account of limited progress in attempts to produce varieties of gooseberry of commercial value resistant to *Sphaerotheca mors uvae*, of red currant resistant to *Pseudopeziza ribis* and of blackcurrant to *Cronartium ribis.*—Max Planck Inst., Voldagsen., Germany.

268. Lamb, R. C.
A study of rest period in the Latham raspberry; environmental conditions which affect the rest period and the relationship of rest to winter hardiness.
Diss. Abstr., 1955, **15**: 314-15, being *Publ.* 11,098 of 125 pp.

In studies on Latham raspberry there was evidence that the rest period began about the same time as growth ceased, and ended about 117 to 149 days from the time of cessation of growth. The sum of days at 45° F. or below was the most consistent measure of the chilling requirement for breaking rest. Temperatures between 34° and 40° F. were effective in the breaking of rest. Different rates of N fertilization and different daylengths were found to have little or no effect on the time of the beginning or end of rest. No histological changes were found in the buds during rest. Canes stored at 60° F. for 2 or 4 days before freezing showed greater cold injury than those taken from the field immediately before freezing.

269. Anon.
New styles in berry trays.
Amer. Fruit Gr, 1955, **75**(11): 24, illus.

Brief illustrated descriptions are given of a 2-piece, telescopic, automatic-setup corrugated container and a twin-compartment, 8-quart, corrugated flat for strawberries; and of steel-rimmed wooden baskets packed 2 together in green corrugated trays for raspberries.

270. Wood, C. A.
Pomology.
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, pp. 14-19, bibl. 1.

Strawberries: observations on June yellows; trials of new seedling selections from Auchincruive. *Apple* and *plum* variety-rootstock trials. Variety trials with strawberry, raspberry, blackcurrant, plum and cherry. *Propagation* of virus-free raspberry stocks from root cuttings. [For other information given on raspberries see *H.A.*, 25: 3631.]

271. Reid, R. D.
The new strawberry variety "Talisman".
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, 1955, pp. 35-6.
Reid, R. D., and Wood, C. A.
Talisman: a report by its raisers.
Grower, 1955, **44**: 669-73, illus.

A cross between pollen parent Climax and an unnamed seedling of American origin. It is, like Climax, immune to ordinary races of red core but susceptible to special physiologic races. Its reactions to viruses are unknown. Up to the time of distribution no June Yellows had been observed. It crops consistently well as a late main crop. The fruit is firm and transports well. Its colour is darker than that of Climax. It is slightly sweeter than Climax. Preliminary jamming and canning tests have given satisfactory results. Quick freeze tests have not been made.

272. Reid, R. D.
West of Scotland Unit (Auchincruive).
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, 1955, pp. 29-34.

Strawberry breeding: to produce high-yielding red-core-resistant varieties suitable for early introduction, and to discover and develop new sources of red-core resistance. *Mycological investigations:* indexing physiologic races of *Phytophthora fragariae*; testing possible new sources of red-core resistance; *Botrytis* infection on Climax was reduced by 4-26% on plots treated with captan. "*Yellows*" *complex*: a study of 10 subclones of Climax was made during degeneration. In yellows-prone varieties the proportion of yellow seedlings produced is related to the degree of development of the condition in the parent plant. Yellow seedlings occurred in all batches under mercury vapour lamps, even in those raised by selfing varieties which had not been known to show the yellow condition. *Raspberry breeding*: to produce high yielding varieties suitable for fresh fruit and canning markets and adapted to local climatic conditions.

273. Blommers, J.
Rassenproef bij aardbeien. **(Strawberry variety trial.)**
Fruitteelt, 1955, **45**: 786, reprinted from *Betuws Tuinbouwblad.*

Nine strawberry varieties were compared when planted at 75 × 28 cm. Climax was the most satisfactory of those grown, but the highest yield (136 kg/are) was given by Ydun. A seedling K 104-4, which is earlier than Deutsch Evern, is a possible forcing variety.

274. Kronenberg, H. G.
Aardbeien. Wat moeten we toch planten? **(Strawberries. What must we plant?)**
Fruitteelt, 1955, **45**: 866-7, illus.

Jucunda and Climax are the only two varieties recommended for processing. Oberschlesien, Macherauchs Frühernte, Regina and Deutsch Evern suit different conditions for fresh fruit growing.

275. Kluge, K.
Untersuchungen zur Züchtung polyploider Monatserdbeeren. Das Verhalten diploider und tetraploider Formen der Sorte Rügen gegen Kahlfrost. **(Research on breeding of polyploid *Fragaria vesca.* The response of diploid and tetraploid forms of the variety Rugen to frost without snow cover.)**
Arch. Gartenb., 1955, **3**:79-83, bibl. 10, illus.

Diploid forms of *Fragaria vesca* were much less susceptible to, and recovered more quickly from, frosty conditions than tetraploid forms. Cultivated strawberry varieties and *F. grandiflora* were intermediate in their degrees of frost sensitivity. *F. moschata* was highly frost resistant.—Inst. Obstb. Obstzücht., Marquardt, Potsdam.

276. Roberts, A. N.
Growth and composition of the strawberry plant in relation to root temperature.
Diss Abstr., 1955, **15**: 932, being *Publ.* 12146 of 107 pp.

Strawberry plants were grown under controlled conditions of root temperature and of nutrient solution concentration. During the vegetative phase growth of aerial portions of the plant was closely correlated with root temperature; there was no such relationship for root growth. Maximum dry weight accumulation in both root and aerial parts of the strawberry occurred in nutrient solutions of relatively low salt concentration. On the basis of dry weight accumulation, maximum growth of all aerial parts during the vegetative phase occurred at root temperatures of between 65 and 75° F. The organic composition of the foliage was not significantly altered by differences in root temperature, although significant changes in the organic composition of the roots were induced. Root temperature had little, if any, effect on the nutrient element composition of the aerial plant parts. The total salt concentration of the nutrient solution had no apparent effect on the percentage of crude fibre and other extractable materials, but did affect the percentage of nitrogenous components and N-free extract in both leaf and root tissue. The salt concentration of the nutrient solution had a marked effect on both total ash content and several of its components in root and leaf tissue. A significant negative correlation was shown to exist between the N-free extract and protein fraction in roots and leaves. There was a significant negative correlation between the ash content and N-free extracts in roots and leaves.

277. (Guttridge, C. G.)
The growth habit of strawberry in relation to environment.
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, 1955, pp. 22-3.

Further evidence was obtained that Royal Sovereign, Climax and Kuntner's Triumph are facultative short-day plants. The day length response is negatively influenced by temperature, so that under suitable conditions, inflorescence initiation occurs more readily as the temperature is lowered. The removal of spring flower trusses and the continuous removal of branch crowns during spring from Climax have an inhibitory effect on inflorescence initiation. Dormancy was to some extent inhibited in Climax by long-day treatment applied outside in the autumn.

278. LUKTON, A., CHICHESTER, C. O., AND MACKINNEY, G.
Characterization of a second pigment in strawberries.
Nature, 1955, **176**: 790, bibl. 6.

The major pigment of the cultivated strawberry is pelargonidin-3-glucoside. Studies reported in 1951 to the National Preservers Association showed that the commercial varieties Marshall, Brightmore, Sovereign and Shasta contained a second anthocyanin in low concentration. Evidence is now presented that it is cyanidin-3-glucoside.—Univ. Calif., Berkeley-Davis.

279. YOKOMIZO, T., AND KATO, K.
Studies on strawberry forcing. No. III. Some factors affecting flower bud differentiation. [Japanese, with English summary 15 l.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 73-7, bibl. 8.

Transferring strawberry plants to a cool site, 650 m. above sea-level, advanced flower bud differentiation. Records kept over 3 years indicated that differentiation occurred when temperatures fell to about 18° C. for a few days. Covering the plants with reeds for a month, which reduced mean temperatures and also shortened day-length by about 20 minutes, advanced differentiation by about 10 days. [For Nos. I and II see *H.A.*, 25: 234.]

280. LEMAÎTRE, R., AND SIRONVAL, C.
Nouvel essai de production de fraises en hiver dans les conditions de la pratique. **(A new experiment on winter strawberry production under practical conditions.)**
Bull. hort. Liège, 1955, **10**: 284-9, illus.

The varieties Deutsch Evern, Triomphe de Tihange and Surprise des Halles were successfully forced to produce fruit at Christmas and New Year. Mme Moutot, which was also forced, did not fruit until mid-January. One-year-old plants were planted out in mid-July; forcing was started in mid-October when the plants were covered by glass. Additional light was given for 16 hours per day, and the temperature was maintained at 20-30° C. in the afternoon and 5-10° C. at night.

281. BORCK, B.
Zur Frage der Eignung des älteren Moostorfes als Bodenverbesserungsmittel im Erdbeeranbau. **(The suitability of old peat as a soil improver in strawberry culture.)**
Arch. Gartenb. 1955, **3**: 115-25, bibl. 5.

Peat was applied to a loamy sand soil before planting strawberries (variety Dresden Hz). In the first year vegetative development of treated plants was somewhat better than that of the controls, a difference that became more marked in the second year. Total yield increases showed that application to the whole plot had the greatest beneficial effect, although furrow application was more effective in the first year. Fruit quality was unaffected by peat application. Vegetative growth was stimulated in treated plants, which produced about 40% more young plants than did the controls. Five years after application a favourable residual effect was still observed in a spinach crop. A study of costs showed a profit of 59 DM/year/¼ ha.—Inst. Gartenb., Dresden-Pillnitz.

282. HITZ, C. W.
The utilization of poultry manure in strawberry production.
Bull. (Tech.) Del. agric. Exp. Stat., **312**, 1955, pp. 29, bibl. 30.

The relative values of various poultry manure applications were assessed during experiments with strawberries between 1943 and 1954 on a Norfolk loamy sand. Strawberries responded well to autumn applications before spring planting, and yields were generally better than those obtained from the recommended application of commercial fertilizer. Manure applied just before planting sometimes caused excessive mortality and reduced yields. Applications of 10 tons of manure per acre gave better yields than 5-ton applications, and were most beneficial in years of relatively high production. Post-planting applications of nutrients were of doubtful value in this area.—Univ. Delaware.

283. RIETSEMA, I.
Hybrides interspecifiques des genres ribes et rubus. **(Interspecific hybrids in *Ribes* and *Rubus*.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

The author notes that ease of crossing varies very greatly and is difficult to foretell. Phenomena incident to the production of successful crosses in both genera are discussed.—Res. Garden for the Province of North Brabant, Netherlands.

Vines.

(*See also* 87, 117c, 220, 326a, b, d, e, j, l, n-q, t, 733c 1242, 1249, 1255, 1269.)

284. BIRON, M.
La sultanine. **(The Sultana [grape].)**
Prog. agric. vitic., 1955, **144**: 256-60.

The culture of the Sultana grapevine, which is concentrated round Smyrna, is described. The fruit is dried or used for wine.

285. I.N.R.A.
Vigne. **(Vines.)**
A.R. Inst. nat. Rech. agron. 1952, 1955, pp. 110-11.

In a trial at the viticultural experimental station at Cours-les-Cosne on the effect of rootstock on yield, 4 hybrid direct producers and 3 vinifera varieties were grafted on 4 different rootstocks. The hybrids outyielded the viniferas on all rootstocks. The rootstock 161-49 gave the best yields with the hybrids, and 41-B with the viniferas. The highest-yielding scion variety was S.7053 and the lowest S.5455. In a trial with 21 hybrid direct producers on their own roots S.V. 18-315 was the highest-yielding and one of the only 2 which produced acceptable wine. A comparison of the yields of these hybrids on their own roots and on various rootstocks gave no conclusive results.

286. TAYLOR, D., AND BOWEN, T. J.
Resistant stocks for grapes at Stanthorpe.
Qd agric. J., 1955, **81**: 15-18, illus.

Details are given of the following phylloxera-resistant vine rootstocks under trial at Stanthorpe: 18804 (Monticola × Riparia), Richter 99 (Rupestris × Riparia), Rupestris du Lot, 1202 (Mourvedre × Rupestris), ARG 1 (Aramon × Rupestris Ganzin), 420A (Berlandieri × Riparia), 3309 (Riparia × Rupestris), and 3306 (Riparia × Rupestris).

287. ANON.
Welke druivenonderstam? **(Grape rootstocks.)**
Meded. Proefstat. Groent. Fruit. Glas, Naaldwijk, October 1955, pp. 1-2.

Five grape varieties are discussed as rootstocks for Black Alicante under glass. White Seedling gives strong growth and the fruit ripens relatively early; storage reports have so far been good. This variety does well on relatively poor soils. Frankenthaler may result in shanking after the first few years, and its berry qualities do not always allow satisfactory storage. Gros Colman is a late variety, a disadvantage for Black Alicante; its keeping qualities may be reduced when it is grown in a cool house. Gros Maroc is not recommended. West Frisia is being increasingly used as a rootstock, especially under conditions where poor growth has been obtained.

288. BERRY-SMITH, F.
Top grafting established grape vines and bench grafting vines.
N.Z.J. Agric., 1955, **91**: 19-29, illus.

A new method for variety replacement has been developed in New Zealand. It consists of making a top-cleft graft on the vine trunk about 6 inches below the bottom trellis wire, and binding the graft with insulating tape. The most favourable time for grafting was in spring between mid-September and mid-October. The variety Baco No. 1, when top-grafted with such varieties as Palomino, Seibel 7053, Seibel 5455 or G.G. 159, produced 30-40 lb. of fruit per vine in the following season. Seibel 5409 has produced larger fruit and given increased yields on Baco No. 1 roots. The second part of the article is based on the writer's experience with and observations on bench grafting in Australia and New Zealand. The best results with bench grafting in New Zealand have been achieved with Mourvedre × Rupestris 1202 stock; good results have also been obtained with Baco No. 1.

289. PREISS, F.
Essais de chauffage du sol en pépinières dans le nord-est. **(Tests on soil heating in nurseries in the north-east [of France].)**
Ann. Soc. nat. Hort. France, 1955, **1**: 50-2, illus.

Young Sylvaner grafts on Riparia × Berlandieri Koper 5 BB were planted over an electric cable laid 25 cm. below the soil surface; soil heating was applied day and night from 12-30 May. After 10 days treated plants showed more vigorous growth than the controls, and wood ripened earlier in the autumn. Plants in the treated row gave 53% take, while the average from untreated rows was 38%. Growth of treated plants was advanced by about 15-20 days, which corresponds with the duration of the heat treatment.

290. WURGLER, W., STAEHELIN, M., AND BOLAY, A.
Observations sur le dépérissement des vignes greffes. **(Notes on decline in grafted vines.)**
Rev. romande Agric. Vitic., 1955, **11**: 83-5, bibl. 7, illus.

Some causes of decline in grafted vines have been previously noted [see *H.A.*, 18: 924]. Additional causes now briefly discussed are: (1) injuries during stratification resulting from fermentation of the sawdust, excessive moisture or too rapid a fall in temperature; (2) failure to callus in the nursery owing to deficient food reserves or inadequate waxing: (3) low temperatures after planting out, poor soil structure or low fertility; and (4) wounds inflicted by cultivating machinery.

291. WEGER, N.
Zur Methodik der Kleinklimakartierung im Weinbau. **(Towards microclimatic surveying in viticulture.)**
Mitt. dtsch. Wetterdienst., 1955, **14**: 132-3.

The desirability of a microclimatic survey of the Rheingau wine district is emphasized. Such a survey would be used, with a soil survey, in an estimation and evaluation of the economic potentialities of the vineyards. Measurements of air temperatures (particularly of night frost danger), radiation, soil temperatures, wind speed and direction, and humidity should be recorded.

292. KUMMEROW, J.
Quantitative Untersuchungen über die Wasserleitfähigkeit von Rebstöcken. **(Quantitative research on the water conducting ability of vine stems.)**
Weinwiss., 1955, **9**(4): 3-16, bibl. 17, illus.

By using photometric methods the specific conducting ability of vine shoots was found to increase in an apical direction; in roots the values were similar at all positions. By Huber's filtration method it was shown that resistance to the transpiration stream was 50% higher at the nodes than at the internodes. *Vitis sylvestris* had the highest specific conducting ability of the *Vitis* species studied. No relation was found between conducting ability and fruitfulness of vines. Fruitfulness was apparently unaffected when a cut in the shoot damaged its conducting ability.

293. DOLL, C. C.
Studies of Concord grape roots in loess soil.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 175-82, bibl. 4, illus.

The root systems of two 6-year-old own-rooted Concord grape plants were dug out in their entirety to study the extent and habit of root growth in loess soils. A 5-year-old vine was also excavated. On a fertile, deep silt loam, the 6-year-old root system had a maximum vertical penetration of 14·5 ft. and a maximum horizontal spread of 22 ft. The greatest concentration of roots was within a radius of 6 ft. of the trunk and to a depth of 8 ft. On a less fertile deep silt loam, the 6-year-old root system had a maximum vertical penetration of 9·5 ft. and a maximum horizontal spread of 24·2 ft. A small concentration of roots was present directly beneath the trunk and also toward the extremities of the two horizontal roots. No response to commercial fertilizers could be seen. [From author's summary.]—Iowa St. Coll., Ames.

294. ANTCLIFF, A. J., AND WEBSTER, W. J.
Studies on the sultana vine. I. Fruit bud distribution and bud burst with reference to forecasting potential crop.
Aust. J. agric. Res., 1955, **6**: 565-88, bibl. 7, map.

Fruit bud distribution and bud burst on sultana canes were studied by microscopical examination of bud samples in autumn and direct observation of vines in spring. The percentage of fruitful buds found by microscopical examination and the percentage bud burst and percentage of fruitful shoots found in spring all showed highly significant differences between bud positions in all seasons. In all cases polynomial regressions could be fitted from which the bud position means did not differ significantly. Fruitfulness was always low at the base of the cane, rose to a maximum at about bud position 9, and then fell away. Bud burst also rose rapidly over the first few bud positions but did not show the same pronounced falling off after bud position 9. The percentage of fruitful buds and percentage of fruitful shoots also showed highly significant differences between seasons and between individual vineyards, and highly significant interactions between seasons and vineyards. The major sultana growing districts did not differ greatly in any respect, nor did the separate settlements within the Sunraysia district. The percentage of fruitful buds agreed with the percentage of fruitful shoots except in seasons of low fruitfulness. The examination of 20 canes from each of 10 Sunraysia vineyards gives a satisfactory estimate of the percentage of fruitful buds in May, and this gives a useful forecast of potential crop. [Authors' summary.]—Commonw. Res. Stat., C.S.I.R.O., Merbein, Vict.

295. ANTCLIFF, A. J., AND WEBSTER, W. J.
Studies on the Sultana vine. II. The course of bud burst.
Aust. J. agric. Res., 1955, **6**: 713-24, bibl. 3.

Sultana vines were examined during bud burst for four seasons, and the date on which each shoot arose was noted. The shoots were later classified as fruitful, barren, or defective. The vines were pruned uniformly in the first season, and two pruning treatments were compared in the other three seasons. In all cases the mean time of bursting at each bud position was progressively later from the distal to the proximal end of the cane, the number of newly-burst buds found at each examination was related to preceding temperatures, and the percentage of fruitful shoots among new shoots found at each examination decreased from the beginning to the end of bud burst. Accessory shoots arising as a result of the death of primary shoots or buds were very rarely fruitful. The results are considered in relation to the discrepancy sometimes found between the percentage of fruitful buds and that of fruitful shoots. [Authors' summary.]—Commonw. Res. Stat., C.S.I.R.O., Merbein, Victoria.

296. SERPUHOVITINA, K. A.
Effect of pinching on flower drop and yield of vine. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 23-5.

Experiments were conducted on 4 vine varieties, the fruiting shoots of which were pinched back at the beginning of flowering to 4 different lengths. Pinching in general reduced flower drop and increased yields, though the varieties reacted differently to the severity of the treatment. Recommendations are made for different varieties.

297. OVERCASH, J. P.
Grape production problems studied at State College.
Miss. Fm Res., 1955, 18(6): 1, 7, illus.

Grafting onto Dog Ridge, a nematode-resistant rootstock, will increase the life and productivity of some grape varieties in Mississippi. Trials were carried out to determine the correct pruning treatment for Concord and Delaware vines on Dog Ridge. With both varieties the highest yields were obtained with very light pruning. The quality of Delaware was high but uneven ripening made the Concord fruit unacceptable. Very heavy pruning and cluster thinning to 1 cluster per shoot resulted in somewhat earlier and more even ripening but reduced the yield excessively. The production of Concord type grapes in Mississippi is considered impracticable until a more suitable variety has been developed.

298. KOZMA, P.
Csonkázási kĭsérlet homoki gyalogmũvélesũ kadarkán. (**Experiments on cutting back unstaked Kadarka vines.**) [Russian and French summaries 3½ pp. each.]
Agrártud. Egy., 1952 (issued 1954), **16** (3, Part 1): 51-113, bibl. 43, illus.

From 1947 to 1952 at the Viticultural Research Institute Kecskemét-Miklsótelep, in a young (6-10 year) and an old (40-44 year) vineyard, unstaked vines, variety Kadarka, were cut back at flowering, in mid-summer and at the beginning of ripening to heights varying from 50 to 170 cm. The effects of both time and severity of treatment on vegetative growth and the quantity and quality of yield are discussed in detail. It is concluded that cutting back unstaked vines of suitable varieties, as practised on the humus-poor, light, sandy soils of the Hungarian Plain, is a sound method of vine growing under the given conditions. For the best results vines of average vigour, having 8-10 shoots of 7-10 mm. diameter and 0·8-1·2 sq. m. leaf area, should be cut back to a height of 90-100 cm. at the beginning of flowering.

299. KRAUS, K.
Bemerkungen zur Umstellung enggesetzter Weingärten auf die Hochkultur. (**Observations on the conversion of closely planted vineyards to high-trellis culture.**) [English, French, Spanish summaries, 5 lines each.]
Mitt. Klosterneuberg, Ser. A, 1955, **5**: 272-6, illus.

An experimental conversion of closely planted vineyards to high trellis culture according to L. Moser's system proved successful in Czechoslovakia. Every second row was grubbed and two shoots of every vine were trained on a high trellis. The method of pruning adopted before and during the conversion is described in detail.

300. WEAVER, R. J.
Relation of time of girdling to ripening of fruit of Red Malaga and Ribier grapes.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 183-6, bibl. 4.

In a 3-year experiment the earliest girdling, when the total soluble solids content of fruit was only 5 or 6% usually resulted in the most rapid maturation, although in 1954 each of the first 3 girdlings produced about an equal advance in maturity. It is suggested that the climatic conditions following girdling are probably more closely associated with rate of maturation than are the conditions preceding girdling.—Univ. Calif., Davis.

301. Blommaert, K. L. J., and Meynhardt, J. T.
Preliminary experiments with hormone sprays as a substitute for the girdling of Zante currants.
Fmg S. Afr., 1955, **30**: 367-8, 376, bibl. 7, illus.

Promising preliminary results have been obtained by spraying Zante currants with para-chlorophenoxyacetic acid (PCPA). The hormone was applied at 20 p.p.m. with a wetter, at 70% fall of caps. Yields from hormone-sprayed vines showed an increase in bunch weight per vine, per individual bunch and per 500 berries, as compared with girdled and untreated vines. Sprayed bunches were fuller and firmer, with larger berries than unsprayed bunches. No significant differences in berry juice, sugar or acid contents were found between treated and untreated vines.—W. Prov. Fruit Res. Stat., Stellenbosch.

302. Overcash, J. P.
Some effects of certain growth-regulating substances on the ripening of Concord grapes.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 54-8, bibl. 14.

Sprays of maleic hydrazide, sodium thiocyanate, 2,4,5-trichlorophenoxyacetic acid and 2,4,5-trichlorophenoxypropionic acid, applied from 1 to 6 weeks before harvest, failed to increase uniformity of ripening in Concord grapes. Injury varied from nil to acute leaf burn, depending on rate of application. Acute leaf burn and shoot injury were accompanied by significant decreases in percentage of ripe grapes and total water-soluble solids.—Miss. agric. Exp. Stat.

303. Weaver, R. J.
Use of benzothiazol-2-oxyacetic acid to delay maturity of grapes.
Bot. Gaz., 1955, **116**: 266-73, bibl. 4, illus.

Spraying with benzothiazol-2-oxyacetic acid at 2·5-20 p.p.m. usually retarded maturation in the Thompson Seedless, Zinfandel and Rebier varieties, but caused little or no foliage damage. Retardation was greater when treatment was applied 4-5 weeks after fruitset than when applied soon after fruitset or after the fruit had reached a degree Balling of 14. When applied to portions of the clusters the growth substance apparently failed to move in appreciable quantities to adjacent grapes. [See *H.A.*, 24: 2379 and 25: 1410.]—Univ. Calif., Davis.

304. Vidal, J.-P.
Contribution à l'étude du diagnostic foliaire au Maroc en 1954. **(Contribution to the study of leaf analysis in Morocco in 1954.)**
Progr. agric. vitic., 1954, **144**: 97-104, 122-9, 154-7, 180-5.

The conclusions drawn from investigations were that (1) vines have lower NPK and especially K requirements in Morocco than in France, the N, P and K nutrient co-efficient in the Moroccan zone of good vineyards, for example, being, 2·3, 0·5 and 1·1 respectively, i.e. a total of 3·9 compared with 5·5 in France; (2) the nutritional status varies from district to district and depends on the physico-chemical characters of the soil and the climate; (3) the older the vines the lower their nutritional status and the greater their fertilizer requirements; (4) rainfall is the major factor governing mineral absorption and irrigation could improve nutrition in very dry districts; and (5) the nutritional requirements of the rootstock must be taken into consideration.

305. Forshey, C. G.
A study of some of the factors affecting the yield and fruit quality of Concord grapes (*Vitis labrusca*).
Diss. Abstr. 1955, **15**: 926-7, being *Publ.* 12024 of 215 pp.

In a nutrient element survey of Ohio Concord vineyards, samples of leaves, fruit and soil were analysed and yields were measured. During the growing season, the N and K contents of the leaves decreased while the Ca and Mg contents increased. The P content decreased in the leaf-blade but remained constant in the petioles. The Mn content of the petioles increased while decreasing in the leaf blades; the reverse was true for Fe. The N and mineral contents of the leaves was more closely associated with yield in July than in June and August. More satisfactory indications of the nutritional status of N, B, Cu and Zn in the vines was given by the leaf blades than by the petioles. The reverse was true for P, K, Ca, Mg, Mn and Fe. High yields were associated with relatively high levels of N, P and K, and with low levels of Mg. There was a highly significant correlation between air space porosity of soil and yield. Neither soil pH nor total organic matter appeared to have a direct relationship to yield. The soluble solids/acids ratio was not a completely satisfactory index of quality; it was inversely related to yield.

306. Schrader, T.
Ergebnisse eines langjährigen Düngungsversuches. **(Results of a long-term vine manurial trial.)**
Weinberg u. Keller, 1955, **2**: 1-14, 79-97.

The aim of the trial started in the Trier area in 1931 was to study the response of vines to manuring throughout their economic life. Owing to war damage the attempt had to be abandoned and records are available only for the period 1931-42. These are some of the conclusions drawn from the manifold data presented: The effect of manurial treatments on the soil is largely confined to the upper layer but K and—to a much lesser extent—Ca and humus penetrated also to the sub-soil. Fairly uniform availability of the nutrients to the plants throughout the growing season was achieved only in the presence of humus. Depletion of nutrients in the soil occurs chiefly in the root sphere, which can be supplemented by surface application in the case of K and Ca but not of P. Surface applications of NPK are deprecated as the balance is upset by individual nutrients reaching the roots at very different speeds. Increased N applications proved beneficial only if the root sphere was well supplied with humus and other nutrients, including minor elements. The relation between manuring, leaf and wood composition, grape yield and must weight is illustrated in tables and graphs and the need for long-term experiments on the nutrition of vines is stressed.

307. Piaget, J. E. H.
Potassium in relation to soil fertility.
Decid. Fruit Gr, 1955, **5**: 184-7, illus.

Experimental evidence is presented to show that K can play an important part in plant nutrition and should not be neglected in the fertilizer programme. The contents of K and other mineral elements in the leaves, petioles, shoots, roots and bunch stalks of Barlinka vines are quoted. In a fertilizer trial on irrigated Barlinka vines in 1953 high N plus P plus K gave the highest yield (2,050 lb. per morgen) followed by high N plus K (1710) and then by low N plus P plus K (1500), where low and high N were 100 and 800 lb. ammonium sulphate, P was 600 lb. 20% superphosphate and K was 600 lb. potassium sulphate per morgen. High N plus P plus K gave the greatest fruit volume (1288 ml. per 160 grapes) followed by high N plus K (1266) and then by low N plus K (1253). In a citrus fertilizer experiment unspecified amounts of N, NP, NK and NPK gave 201, 185, 293, and 273 lb. uncreased oranges per tree respectively.

308. Dobroljubskiĭ, O. K., and Slavvo, A. V.
Foliar nutrition of vine with the micro-element chromium. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 6, pp. 43, bibl. 3.

Solutions of chromium sulphate were sprayed on the vine variety Aligote on 18 June and 12 July at 0·005 g. or 0·00005 g. of $Cr_2(SO_4)_3$ in 200 cc. per plant. The higher concentration was found to increase the size of the berries at an early date, and both concentrations, particularly the lower one, increased the sugar content and reduced acidity as compared with the controls. As the treatment is shown to hasten maturation it is suggested that Cr should be applied in northern vineyards.

309. Commonwealth Scientific and Industrial Research Organization, Australia.
[Sultana vine soil management.]
A.R. C.S.I.R.O., 1954, 1954, p. 35.

In a trial at the Commonwealth Research Station (Murray Irrigation Areas), Merbein, Victoria, vines under weed control by oil spraying are behaving and yielding normally, but permanent white clover is resulting in much reduced yields.

310. Fleming, H. K., and Alderfer, R. B.
Manure and grape residues as organic supplements in the soil management program of a Concord grape vineyard.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 167-74, bibl. 6.

The effects of grape stems, pomace, prunings and FYM as organic supplements to an old Concord vineyard were investigated over a period of 8 years on an eroded and non-eroded phase of a gravelly sand loam. The application of grape stems, pomace or manure at the dry-weight equivalent of 6 tons per acre FYM every third year resulted in a significant and profitable increase in yield of approximately $\frac{1}{2}$ ton of grapes per acre per year on the eroded soil. It also resulted in an increase in growth compared with the controls. The application of these materials to the non-eroded soil had no appreciable effect on growth or yield, in spite of a significant increase in soil organic matter content. The annual return of the prunings to the eroded soil resulted in a trend towards higher yields, but did not produce an improvement in growth. The addition of prunings to non-eroded soil had no beneficial effect on growth or yields.—Pa St. Univ., University Park.

311. Coombe, B. G., and Allan, H. R. M.
Vineyard nutrition on deep white sands. Progress report of cover crop nutrition trials at Blewitt Springs.
J. Dep. Agric. S. Aust., 1955, **58**: 455-60, bibl. 1, illus.

The early decline of vines in deep white sands is mainly due to a complex of nutrient deficiencies in the soil. Foliar sprays had no effect on vine growth in 1954-55. Preliminary trials have shown that good growth of subterranean clover as a cover crop is obtained by applying a mixture of artificial fertilizers supplying P, K, Ca, S, Mg, Cu, Zn, B, Mn and Mo. The omission of potash resulted in very poor growth of clover.

312. Káš, V., and others.
Předběžné výsledky pőkusů s podkulturou ve vinicích. (Příspěvek k řešení otázky zabránění t. zv. únavě půdy ve vinicích). **(Preliminary results of trials with cover crops in vineyards. (A contribution towards solving the problem of the prevention of so called soil sickness in vineyards.))**
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba,* 1955, **28**: 213-20, bibl. 8.

The first results of a series of long-term experiments indicate that mixed legume cover crops sown between rows of vine had a favourable effect on the carbon and nitrogen cycles and on the biological composition of the soil. The cover crops did not deprive the vine of water nor did they appear to increase the incidence of peronospora.

313. de Serpa Pimentel, E. M. F.
L'emploi du réfractomètre dans la détermination de l'époque de récolte. **(Use of the refractometer for determining harvesting date.)**
Bull. Off. int. Vin, 1955, **28**: 235-7.

Practical notes are given on the use of the Zeiss refractometer which requires the use of less must than does the densimeter and gives quicker results than does chemical analysis. Figures are given for the sugar contents of a number of musts as determined by densimeter, refractometer and chemical analysis.—Posto vitivinicola, Regua, Portugal.

Nuts

(*See also* 33, 39, 117c, 173, 326i, s, 424.)

314. Hendrickson, A. H., and Veihmeyer, F. J.
Daily use of water and depth of rooting of almond trees.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 133-8, bibl. 3.

The data presented show the average daily losses of moisture from the volume of soil occupied by the entire root system in a 10-year-old almond orchard on a Vina loam soil in the Sacramento Valley of California during the period May 12 to September 29, 1953. The greatest losses occurred in the period between June 9 and August 4, when the average daily loss was 0·293 inches. The average rate of loss decreased rather markedly in early August. The slow reduction in soil moisture below 9 ft. indicated that these almond trees had not thoroughly permeated the soil below this depth. [From authors' summary.]—Univ. Calif., Davis.

---

* Formerly *Sborn. čsl. Akad. Zeměd. Věd., Ser. A.*

315. Hansen, C. J., and Kester, D. E.
Almond varieties on plum roots.
Calif. Agric., 1955, **9**(9): 9, illus.

Several plum stocks are being tested as rootstocks for almonds, growing in soils which are heavy and wet, or infected with oak root fungus [*Armillaria mellea?*]. Marianna 2623 and 2624 are the most promising and Ne Plus Ultra, Texas, Peerless, Jordanolo and in most cases IXL are making satisfactory growth on these stocks. The trees are smaller than those on almond or peach stocks, but good to moderate nut yields have been obtained. Jordanolo and Havens 2B are being tested as intermediates for Nonpareil on Marianna 2624, as growth is not satisfactory with direct grafting. Marianna 2624 is the most resistant to oak root fungus of the plum stocks tested. Myrobalan rootstocks have not so far shown promise for almond.—Univ. Calif., Davis.

316. Hansen, C. J.
Influence of the rootstock on injury from excess boron in Nonpareil almond and Elberta peach.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 128-32, bibl. 5, illus.

Almond, Lovell peach and Shalil peach were used as rootstocks for young Nonpareil almond, and the same 3 rootstocks and apricot for young Elberta peach trees, in pot experiments in which boron was supplied in concentrations of 0·5 to 10 p.p.m. It was found that the rootstock had an influence on the amount of injury caused by an excess accumulation of B in the leaves and stems. The least amount of injury occurred with almond and peach trees on almond roots.—Univ. Calif., Davis.

317. Vieitez, E.
Toxicidad y capacidad rizogénica de algunos tratamientos hormonales empleados en la reproducción vegetativa del castaño. (**Toxicity and root growth promotion of some growth substances used in the vegetative propagation of sweet chestnut.**) [English summary ½ p.]
An. Edaf. Fis. veg. Madrid, 1955, **14**: 313-60, bibl. 11, illus.

In continuation of earlier research [see *H.A.*, 22: 3531] a number of growth substances were tested for the induction of rooting in sweet chestnut cuttings. The best results were given by a mixture of IBA and NAA, each at 5 mg. per g. lanoline, with the sodium salt of 2,4-D at 1 mg. per g. Percentage strike and dead cuttings were 40 and 42 respectively with May treatment and 20 and nil with June treatment.

318. Vieitez, E.
El empleo de sustancias de acción hormonal en el enraizamiento del castaño por acodo bajo. (**The use of growth substances for the rooting of chestnut layers.**) [English summary ⅓ p.]
An. Edaf. Fis. veg. Madrid, 1955, **14**: 483-518, bibl. 5, illus.

Marcotting studies on chestnut [see *H.A.*, 23: 3944] were followed by layering experiments with the use of growth substances. The experiments took place between early May and late July on very vigorous, erect shoots and on erect and drooping shoots of moderate vigour. The growth substances used were IBA, NAA, IAA and 2,4-D and its derivatives. These were applied in a lanolin paste to a 3-4 cm. length of branch which was then covered with moss and buried. The results were: (1) Rooting was best in vigorous, erect shoots, viz. 85-100% after 14 days, and poorest in drooping shoots of moderate vigour. (2) The best results were obtained between late May and early June. (3) The best treatments were (*a*) 3 mg./g. 2,4-dichlorophenoxybutyric acid and (*b*) 12 mg./g. IBA plus 0·1 mg./g. 2,4-D or derivative.

319. Kalmár, Z.
A kalaposgombák és fás növények mykorrhizakapcsolatainak kertészeti vonatkozásai. (**Mycorrhizal relations between fungi and woody plants in relation to horticulture.**) [English and Russian summaries ½ p., each.]
Agrártud. Egy., 1951 (issued 1953), **15**(2, Part 2): 3-10, bibl. 11.

The importance of ensuring the presence of the correct fungi as mycorrhiza when propagating or transplanting certain woody plants, including sweet chestnut and hazel, is stressed. Some associated fungi acting as mycorrhiza of 6 species are mentioned.

320. Rivals, P., and Evreinoff, V.A.
Sur les moyens susceptibles de remédier à la stérilité du noisetier à la Réunion. (**On means of overcoming sterility of hazel in Réunion.**)
Rev. agric. Réunion, 1955, **55**: 207-12, bibl. 6.

Hazel grows well at 1,300-1,500 m. in the mountains of Réunion but is sterile. Suggested methods of overcoming this sterility are (1) planting at 2,000 m. and above, where climatic conditions would be more suitable; (2) introducing other varieties with a different flowering season and capable of cross fertilization; and (3) delaying the development of the male flowers or advancing the development of the females by chemical treatment.

321. Thyssen, P.
Eine kleinblättrige Haselnuss. (**A small-leaved hazel.**)
Dtsch. Baumsch., 1955, **7**: 241-2, illus.

An illustrated description is given of *Corylus avellana f. microphylla* found among wild hazels.

322. Chryssoheris, F. P.
Plant propagation problems. The relationship of the dormant condition of pistachio leaf buds to budding practice. [Greek with English summary 1 p.]
Doctor's Thesis Superior School Agric. Athens, 1955, pp. 46, bibl. 53, illus.

The dormancy of leaf and flower buds of the female pistachio tree (*Pistacia vera*) has been determined for the first time, and the mechanism of dormancy was studied by observation and experimentation under natural conditions. It was found that the degree of dormancy of the leaf buds was determined by their position on the shoot as well as by the season, basal buds being in a more dormant condition at any given time than apical buds. The application of this finding to nursery practice, i.e. in choice of budwood and time of budding, is described. It is considered that by selection of suitable budwood for summer or early autumn budding it will be possible to produce uniform trees fit for sale by the time growth ceases in the autumn and by this means to save a year in the nursery stage. This work is to be extended.

323. KRUMBIEGEL-RICHTER, B.
Beobachtungen über die Entwicklung der Blüten bei Walnuss (***Juglans regia***). **(Observations on flower development in walnut.)**
Arch. Gartenb., 1955, **3**: 105-14, illus.

The flower buds of a walnut clone (Pillnitz W.29) were studied microscopically at intervals throughout the year. Female flowers started differentiation at the beginning of October, with the formation of the first bracts and ovaries. Further development of bracts, perianth and stigmata occurred at the beginning of April. Initiation of male flowers began in May with bract formation. In June the bracts, perianth and pollen lobes were formed. At the end of April in the following year pollen formation started.—Inst. Gartenb., Dresden-Pillnitz.

324. ŠČEPOTJEV, F. L.
Secondary growth and secondary flowering of the Persian walnut. [Russian].
Bot. Žurnal, 1955, **40**: 116-25, bibl. 25, illus.

A description is given of shoots which arise from peculiar summer buds occurring on the tips of fruiting branches during normal flowering and which start growth after 1½ to 2 months' dormancy. These secondary shoots do not usually flower during the same season, but, if the primary inflorescence is destroyed by frost, they produce secondary flowers both uni- and bi-sexual [see also *H.A.*, 24: 3571]. The morphology of the bisexual flowers is detailed and the possible evolution of the walnut flower is discussed.

325. DOROFEEV, P. P.
Planting walnut groves in Moldavia. [Russian.]
Sad i Ogorod, 1955, No. 8, pp. 61-5, illus.

Among six forms of walnut described types referred to as *globosa*, *elongata*, *ovalis* and *obovata* are recommended for nut production. Seed is sown *in situ* in groups of 6–10, either in autumn or spring, the latter following stratification. On level ground the groups are spaced at 5 × 5 m., and on slopes at 3-4 m. apart in rows 5 m. apart. The groups and later the stands are thinned until at 25 years the final stand is 10 × 10 m. on the level, or closer on sloping ground as an anti-erosion measure. Cover cropping is practised and where necessary irrigation is applied.

Noted.

326.

a ANON.
Increased production per donum of land.
CHIMONIDES, S. J.
Planting vines on the contour. Soil erosion and the new method of contour planting.
Countryman, Nicosia, October 1955, pp. 4-5, and p. 6.
Advice on fertilizing and contour planting of vines in Cyprus.

b BERKAN, H.
Güney ve güneydoğu, doğu ve orta anadolu bölgeleri kuru üzüm ve incirleri üzerinde analitik araştirmalar. **(Analytical investigations on raisins and dried figs produced in south and south eastern, eastern and central Anatolian districts.** [English summary ½ p.]
Tekel Enst. Raporlari, 1954, **6**: 311-16.
Chemical analyses of 6 varieties of raisin and 1 fig from Anatolia.

c CHANDLER, F. B.
Cranberries.
Fruit Var. hort. Dig., 1955, **10**: 27-8.
Notes on 7 varieties.

d COSMO, I., COMUZZI, A., AND BORDIGNON, S.
Indagini sulla ricostituzione viticola della Venezie ai fini dell'orientamento per i futuri impianti. . . . Provincia di Vicenza, terzo contributo. . . . Idem, sesto contributo. **(Studies on vineyard reconstruction in Venetia with a view to future planting. . . . Province of Vicenza, 3rd contribution and 6th contribution.)**
Ann. Sper. Agrar., 1955, **9**: 321-48 and 1197-1234.
[For 4th and 5th contributions see *H.A.* 25: 3673d.]

e COSMO, I., POLSINELLI, M., AND HUGUES, M.
Indagini sulla ricostituzione viticola delle Venezie ai fini dell'orientamento per i futuri impianti. . . . Provincia di Gorizia. . . . primo et secondo contributi. . . . **(Studies on vineyard reconstruction in Venetia with a view to future planting.** 1st and 2nd contributions.) [English summaries 8 and 7 lines.]
Ann. Sper. agrar., 1955, **9**: 975-1021, bibl. 6, illus. and 1023-63, illus.

f CRANG, A., AND STURDY, M.
A comparison of some varieties of fruit preserved by bottling and by freezing: progress report V.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 192-8, bibl. 5.
The preserving quality of 15 varieties of raspberry and 9 of strawberry.

g DARROW, G. M.
The giant Colombian blackberry of Ecuador.
Fruit Var. hort. Dig., 1955, **10**: 21-2, illus.
Rubus macrocarpus with fruits up to 4 in. long; of possible value for breeding.

h FELLERS, C. R., AND ESSELEN, W. B.
Cranberries and cranberry products.
Bull. Mass. agric. Exp. Stat., **481**, 1955, pp. 62, bibl. 86, illus.

i GAYFORD, G. W.
Nut growing in Victoria.
Fruit World, Melbourne, 1955, **56**(8): 15-23.
Culture and varieties of almonds, walnuts and filberts.

j GORJUNOV, N. S.
Sprinkler irrigation of vineyards. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 25-6, bibl. 2.

k HOOVER, M. W., AND DENNISON, R. A.
A rapid objective method for the evaluation of color in strawberries.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 195-8, bibl. 4.
With the Hunter Color-Difference Meter.

l HUGLIN, P.
Étude sur la morphologie, la phénologie et la productivité des principaux cépages de *V. vinifera* L. cultivés en Alsace. **(Study on the morphology, phenology and productivity of the main varieties of *Vitis vinifera* cultivated in Alsace.)**
Ann Amél. Plantes, 1955, **5**: 5-51, bibl. 10, illus.
10 varieties including Chasselas and Sylvaner.

m LOEWEL, E. L., AND LABUS, S.
Wie steht es mit dem Anbau von Schwarzen Johannisbeeren auf leichten Böden? **(Black currant growing on light soils.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 203-8.

n RODRIGUES, A.
Contribution à l'étude des rapports entre le volume et la forme des grains, le nombre et le poids des pépins, dans la *Vitis vinifera* L. **(Contribution to the study of the relationships between the volume and the shape of the grapes and the number and the weight of the pips in *vitis Vinifera*.)**
Bull. Off. int. Vin, 1955, Vol. **28**, No. 292, Suppl. pp. 107-20, bibl. 4, illus., and No. 293, Suppl. pp. 121-8.
In 8 varieties grown near Alcobaça, Portugal.

o RODRIGUES, A.
Valeur de la carpométrie dans la détermination ampélographique. **(The value of fruit measurement in the identification of vine varieties.)**
Bull. Off. int. Vin., 1955, Vol. **28**, No. 293, Suppl. pp. 128-52, bibl. 3, illus.
In 8 Portuguese varieties.

p SCHOLANDER, P. F., LOVE, W. E., AND KANWISHER, J. W.
The rise of sap in tall grapevines.
Plant Physiol., 1955, **30**: 93-104, bibl. 47, illus.
The hydraulic relations of *Vitis labrusca.*

q TURKOVIĆ, Z.
Untersuchungsergebnisse über *Vitis silvestris* Gmelin im Jahre 1954. **(Observations on *Vitis silvestris* in 1954.)**
Weinberg u. Keller, 1955, **2**: 74-9, illus.
In Yugoslavia. See also *H.A.*, 25: 273 p.

r VOLUZNEV, A. G.
New varieties of small fruits in White Russia. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 43-6, illus.

s WIKESJÖ, K.
Gotländska valnötsträd. **(Walnut trees in Gotland, Sweden.)**
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 173-83, illus.

t ZABALA, S.
Comportamiento en Villa Alberdi (Tucumán) de tres variedades de vides, del grupo de los híbridos productores directos. **(The performance of 3 hybrid direct producers at Villa Alberdi, Tucumán.)**
Idia, 1955, No. 88, pp. 12-13, illus.
Baco1, Vaco 2-16 and Seibel 70-53.

PLANT PROTECTION OF DECIDUOUS FRUITS

General.

(*See also* 118h, 290, 445u, z, 1282.)

327. ORDISH, G.
Some notes on the economics of crop protection.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Remedies for pests may be classified as mechanical, biological or chemical. A ratio should be established between cost and potential benefit. The benefit may consist of so reducing pests that a greater yield is obtained from a smaller area, thus releasing land for other crops.—Plant Protection, London.

328. WOOD, R. K. S., AND TVEIT, M.
Control of plant diseases by use of antagonistic organisms.
Bot. Rev., 1955, **21**: 441-92, bibl. 190.

Work is reviewed on the possibility of disease control by the introduction or encouragement of micro-organisms either parasitic on the pathogen or secreting substances toxic to the pathogen. The most interesting section to the horticulturist deals briefly with the control of specific diseases, including the following: *Rhizoctonia solani*, *Pythium debaryanum*, *Phytophthora parasitica*, *Fusarium oxysporum cubense*, *Phytomonas caryophylli*, *Cronartium ribicola*, *Sphaerotheca mors uvae*, *Botrytis cinerea.* A short note considers possibilities with regard to storage diseases of fruit and vegetables.

329. OLSEN, O. B.
Om "traktoser" (traktorskador) i fruktodlingar. **(Tractor damage in orchards.)**
Fruktodlaren, 1955, No. 4, pp. 107-12, illus.

The growth of weeds or *Melilotus* and the encouragement of earthworms are recommended palliatives.

330. FERNÁNDEZ VALIELA, M. V., AND BAKARCIC, M.
Nuevas enfermedades del ciruelo en el Delta del Paraná. **(New diseases of cherry in the Paraná delta.)**
Idia, 1954, No. 84, pp. 2-6, illus.

Three cherry diseases which have recently appeared in the Paraná Delta are heart rot due to *Fusarium lateritium*, a branch and fruit canker of unknown cause, and a leaf margin scald of virus origin. The common early, mid-season and late varieties grown in the area are named.

331. BRANNON, D. H., AND OTHERS.
Recommendations for cranberry production in Washington.
Ext. Circ. Wash. St. agric. Ext. Serv., **144**, revised 1955, 1 large chart.

The circular takes the form of a chart presenting information on: (1) Major pests and diseases and their control; (2) special fungicide sprays for fresh-market berries; (3) sprinkling for protection against frost or high temperatures; (4) weed control.

Disturbances of nutrition or of unknown origin.

(*See also* 82, 316, 445y.)

332. HILL, R. G., JR.
The correction of chlorosis in blueberries with chelated iron compounds.
Down to Earth, 1955, **11**(2): 6-7, illus.

Chlorosis in 4-year-old blueberries was corrected by application of 100 g. of iron chelate per plant. Chlorotic symptoms disappeared within a month, and in the following season the plants grew vigorously and gave better yields than untreated plants.—Ohio agric. Exp. Stat., Wooster.

333. CAIN, J. C., AND HOLLEY, R. W.
A comparison of chlorotic and green blueberry leaf tissue with respect to free amino acid and basic cation contents.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 49-53, bibl. 13.

Data are presented comparing the basic cations content (Ca + K + Mg) and several nitrogenous fractions of healthy and chlorotic blueberry leaf tissue. Samples were compared from field selections as well as from sand cultures when chlorosis was produced by using nitrate as an only source of N, and by treatment with Co and Ni. Data expressed in terms of unit leaf area show greater dry weight and basic cations in green leaf tissue. Soluble nitrogenous constituents, of which arginine constituted by far the greatest portion, were much higher in chlorotic leaves than in green leaves. [Authors' summary.]—N.Y. St. agric. Exp. Stat., Geneva.

334. WOODBRIDGE, C. G.
Magnesium deficiency in apple in British Columbia.
Canad. J. agric. Sci., 1955, **35**: 350-7, bibl. 9, illus.

Magnesium deficiency (leaf blotch) in apple in the interior fruitgrowing areas of British Columbia was found to be widespread. In some orchards there was only a slight deficiency, few leaves showed symptoms of leaf blotch, and the vigour and productiveness of the trees did not appear to be affected. In others, the deficiency was marked, severe defoliation occurred, and few apples sized and matured. Soil applications of Mg salts were not effective in preventing symptoms of the deficiency, but foliage spray applications, using 2% solutions of magnesium sulphate, were effective. When the deficiency was severe, as many as eight sprays were required to correct it; and when the deficiency was slight, one spray was beneficial. When the Mg content of leaves fell below 0·18% Mg on a dry weight basis, leaf blotch symptoms were invariably present, and when the content was above 0.26% no symptoms were observed. Jubilee and Newtown varieties were more susceptible to leaf blotch than were other varieties grown in this area. [Author's abstract.]—Canada Dep. Agric., Summerland, B.C.

335. NATALJINA, O., AND FEDOROVA, A.
A study of the nature of the rosette disease of apple trees. [Russian.]
Sad i Ogorod, 1955, No. 7, pp. 68-9, illus.

An earlier assumption that the disease is caused by a virus [see *H.A.*, 22: 296] was not confirmed. A disturbance of metabolic activity due to wounding is now considered as one of the possible causes. The disease was observed on rootstocks in the nursery as well as on mature trees. Infected nursery material should be destroyed.

336. GERBER, H., AND BUSSMANN, A.
Über die vorzeitige Herbstverfärbung bei Reben. **(On premature autumn-colouring in vines.)**
Schweiz. Z. Obst-u. Weinb., 1955, **64**: 340-3, illus.

In preliminary trials premature autumn-colouring of vines was controlled by several foliar applications (2%) of MgO and $MgSO_4$, while little or no response was obtained from spraying with Hoagland's trace element solution or from 1% $MgSO_4$ soil applications by fertilizer lance. In view of its rain resistance MgO was more satisfactory than $MgSO_4$.

337. BOULD, C., AND BRADFIELD, E. G.
A failure in apple trees on a strongly acid soil.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 69-73, illus.

A soil condition causing restricted leaf and shoot growth, die-back and bark pimpling in pyramid apple trees has been investigated and shown to be associated with soil acidity. Leaves and bark from severely affected trees contained high concentrations of Mn and low levels of Mo, typical of plants from strongly acid soils. [Authors' summary.]

338. BAXTER, P.
Manganese excess in peach trees.
J. Aust. Inst. agric. Sci., 1955, **21**: 170-2, bibl. 10.

Excessive uptake of manganese by peach trees has followed the acidification of a typical Goulburn Valley loam through repeated applications of sulphate of ammonia. Leaf symptoms of excessive manganese in Golden Queen Peach trees are described. Leaf manganese content was directly related to the H ion concentration of the soil. Fruit yields were not affected and the application of lime prevented re-appearance of leaf symptoms. [Author's summary.]—Dep. Agric., Victoria.

339. BROWN, J. G., AND VOTH, V.
Salt damage to strawberries.
Calif. Agric., 1955, **9**(8): 11-12, illus.

"Results of the tests indicate that when irrigation water containing more than 100 p.p.m. of sodium plus chloride is used to irrigate strawberries by the furrow system, there may be sufficient salt accumulation to produce a measureable decrease in the first harvest yield of berries, although the plants themselves show no visible sign of injury. On soils sufficiently permeable to water, changing from a furrow system to a sprinkler system of irrigation may effectively reduce salt accumulation so that higher first harvest yields are obtained. Sprinklers are much less effective in holding down salt accumulation during the second year because there is considerable salt accumulation while the first crop is being harvested, when it is not practicable to use the sprinkler system."

340. BÖMEKE, H.
Weiterer Beitrag zum Röteln der Kirschen. **(Further notes on fruit drop in cherries.)**
Mitt. ObstbVersuchringes Jork, 1955, **10**: 194-9, bibl. 2.

An examination of cherries of several varieties at different stages showed that all fruits with a diameter of more than 5 mm. had been fertilized. Living embryos were found in some dropped cherries and dead embryos in some ripe fruits on the tree, but parthenocarpic fruits were never encountered. The author believes that lack of nutrient supplies at the critical period is the chief cause of fruit drop in cherries, and he recommends the application of liquid fertilizer (NPK) 2-3 weeks before flowering. In a dry spring irrigation during and after the blossom period would also be advisable. [See also *H.A.*, 25: 1440.]

341. SMITH, L. C., AND WISHART, R. L.
Minimising tree losses from apricot gummosis.
J. Dep. Agric. S. Aust., 1955, **58**: 450-4, illus.

Gummosis infections may be detected early and removed completely, without loss to the main framework, by modifying the present pruning methods for apricots. By making no cuts on the main branches the amount of wounding can be reduced; pruning cuts should be made at least 1 ft. away from the main limbs. Any infections, therefore, may be cut out before becoming established in the main framework. The modified system is not harmful to fruit quality, but non-irrigated trees may need some fruit thinning.

Climatic factors.

(*See also* 19-26, 83, 118e, f, 161, 268, 275, 291, 950.)

342. COURSHEE, R. J.
Summary of work on frost prevention.
[French and German summaries 7 lines.]
Tech. Mem. N.I.A.E. **120**, 1955, pp. 8, bibl. 27.

Investigations which were stopped before completion for economy reasons have not brought to light any economical method of frost protection for fruit. Studies were made on temperature, radiation and wind-speed measurement, and on fans, heaters and sprinkler irrigation, and they are here summarized.

343. LOEWEL, E. L.
Frostschäden an Obstbäumen in Abhängigkeit von Sorte, Stammbildner, Unterlage und Boden. **(Frost damage to fruit trees and its relation to variety, stem builder, rootstock and soil.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A plea for a comprehensive study of work done during the last 20 years on frost damage as affecting fruit species, varieties, rootstocks and stem builders. Consideration should be given to different kinds of frost and the effect of soils, interculture and manuring. Such a review would form the basis of future planting.—Obstbauversuchsanst. Jork, Germany.

344. PERRAUDIN, G.
La sensibilité des arbres fruitiers au gel printanier. **(The susceptibility of fruit trees to late frosts.)**
Rev. romande Agric. Vitic., 1955, **11**: 87-8.

Investigations on 5 pear varieties in 1955 (severest late frost —4·9° C.) showed that yield does not depend solely on the percentage of flowers killed. The yield of Louise-Bonne (245,000 kg. per plot), on which 70% of the flowers were killed, was 6 times that of Beurré-Giffard (40,000), on which only 39% of the flowers were killed. Conference, on which 96% of the flowers were killed, produced a remarkable yield of 219,000 kg., 98% of the fruits being parthenocarpic. Passe-Crassane, with only 33% of the flowers killed and a yield of 260,000 kg., was the least susceptible. Young trees of 9 apple varieties were investigated for resistance of the foliage to late frost. Franc-Roseau, Winter Banana and Golden Delicious were rated as resistant and Belle de Boskoop, Gravenstein and Stayman Double Red as very susceptible.

345. BÖMEKE, H.
Uber die Ursache des Aufkahlens der Süsskirschen im Alten Land. **(On the cause of defoliation of sweet cherries in the Alte Land.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 208.

The absence of leaves on the lower branches of sweet cherries and other symptoms of spring frost injury are discussed.

346. RHOADES, D. G., AND OTHERS.
Frost protection in almonds.
Calif. Agric., 1955, **9**(8): 3-5, 14, illus.

Two wind machines driven by 25 h.p. electric motors and producing thrusts of 280 lb. and 340 lb. respectively were tested in almond orchards while the trees were still relatively bare and later on when they had considerable foliage. The protection achieved was unsatisfactory for two reasons: (1) The air above the tree tops was not sufficiently warmer than that in the trees to provide a good source of heat; (2) the triangular pattern of planting and the size of the trees did not leave any channels for the jet to pass through, especially when the leaves were out. Under the conditions of the test a portable heater wind machine also failed to afford the protection required for commercial success. Growers, on the other hand, obtained good results with 20 or more ordinary heaters per acre and with extra units around the headlands. The response to the three types of wind machine is illustrated by seven plot diagrams, and the methods by which records were taken are discussed in detail. [See also *H.A.*, 25: 932.]

347. Childs, W. H.
Paper protects strawberries.
A.R. W.Va agric. Exp. Stat. 1954-1955, issued as *Science Serves your Farm, Bull.* **369**, Part 4, 1955, p. 3.

A water-resistant paper with and without waxing was used as a cover for flowering strawberries (varieties Premier and Catskill) during frost periods. Results showed that it was superior to straw as a frost protector and in ease of handling. Further research is necessary on methods of anchoring and on drying after rain. At present the paper costs 1½ cents per foot run.

348. Filewicz, W., and Modlibowska, I.
The hardiness of the south-western part of the tree as the major factor in its survival during test winters.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

From observations made over many years it is concluded that apple trees of tender varieties can be enabled to survive the rigours of a Polish winter by top grafting the S.W. part of the top with hardy varieties.—Sinoleka Pomol. Res. Stat., Poland.

349. Oldén, E. J.
Undersökningar av köldskador hos vissa plommonsorter efter artificiella frysningar vintern 1953-54. (**Studies on cold injuries to certain plum varieties after artificial freezing in the winter of 1953/54.**) [English summary, p. 1.]
Sver. pomol. Fören. Årsskr. 1954, 1955, **55**: 36-50, bibl. 11, illus.

From 6 to 11 December and from 19 to 24 January shoots of 6 hexaploid and 3 diploid plum varieties were exposed in freezing chambers to temperatures ranging from −5° to −25° C. and from −8° to −35° C. respectively, cold injury being assessed by the degree of tissue browning. With the exception of fruit buds, cold resistance increased from December to January so that during the second test the material tolerated about 5° C. of frost more than in the first test. The bark proved very hardy during both periods, only the cortex cells showing browning at the lowest temperatures. Changes induced in the tissues of the wood appeared chiefly in the outer layers of the secondary xylem, especially in the spurs. The cambium was much more resistant in January; xylem cells continued to be formed after exposure of the shoots to −35° C., though the arrangement of the vessels was different from that in the controls. Severely injured xylem and pith tissue seemed to have a higher starch content than only slightly damaged tissue. Fruit buds proved very hardy, but more so in December than in January. Differences in the frost resistance of the varieties tested were considerable, the hexaploid plums being intermediate between Gloria and the two other diploid varieties.—Balsgård.

350. Tasmanian Department of Agriculture.
Skin blemish on "Alfriston" apples.
Tasm. J. Agric., 1955, **26**: 262, illus.

Slightly sunken, translucent spots were noted in 1954/55 on Alfriston and Democrat apples. Individually the spots were small, but they coalesced to affect large areas of skin. The blemish was superficial, and tended to be more severe on the shaded side of the tree and fruit. There was no evidence that it was caused by any of the newer spray materials, and it may have been caused by the high temperatures prevailing during the growing season.

351. Bremer, H.
Pathologische Beobachtungen an Obstbäumen im Trockenklima. (**Pathological observations on fruit trees in an arid climate.**) [English summary, 24 lines.]
Z. PflKrankh., 1955, **62**: 500-14, bibl. 26, illus.

The following observations were made in the Ankara region of Turkey during the author's stay of several years in that country: (1) Of deciduous fruit trees, apricots, pears and acid cherries were found to be best adapted to an arid climate. (2) With the exception of pear, the stomata remain closed in summer from the late hours of the morning onwards. (3) According to fruit species, any of the following symptoms are liable to appear as a result of severe drought: anthocyanosis, summer leaf fall, curling of leaves in one-year-old shoots, bronzing due to epidermis injury, sunscald, dwarfing and yellowing of leaves. (4) Fruit tree seedlings will perish in an arid climate unless their roots reach the permanently moist layer of soil before the beginning of summer. (5) Mistakes frequently made in the cultivation of fruit trees under arid conditions include excessive irrigation, late irrigation and deep planting, which respectively cause "irrigation disorders", frost injury and crown rots. (6) Irrigation in dry air tends to induce chlorosis in most fruit species. (7) Apoplexy of apricots is due to a variety of conditions among which over-taxing the drought resistance is probably an important factor. As a mass phenomenon it is always associated with a dry climate. (8) In a somewhat less arid valley apples were found to thrive, especially when closely planted in a mixed orchard shaded by apricot or pear and intercropped with such deep-rooting crops as vine and lucerne which give off water vapour. (9) Fruit rot of figs is due to the incidence of moist sea winds during ripening, while root rot of figs is caused by natural flooding or excessive irrigation. (10) In fruit trees exposed to environmental factors injurious to the foliage the normal course of defoliation is modified. (11) The diseases and pests of fruit trees characteristic of the arid climate of Anatolia are discussed.

352. Melville, F., and Hardisty, S. E.
DNC oil sprays for deciduous fruits.
J. Agric. W. Aust., 1955, **4**: 345-53, illus.

Sprays of DNC in winter oil were applied to peaches, apples, pears and plums about 6 weeks before flowering, to reduce delayed foliation effects. Ruby Red peach trees, sprayed at a strength of 1 part 2·5% DNC emulsion to 39 parts water, flowered profusely for a relatively short period; full bloom was about 10 days ahead of that on unsprayed trees and was rapidly followed by leafing out. Sprays (at 1 part in 20) applied to Granny Smith apple trees caused early and uniform spur burst; the gain in growth was maintained throughout the season, and yields from sprayed trees were greater than those from unsprayed trees. Other apple varieties which responded well were Rome Beauty, Golden Delicious, Yates and Dougherty. Jonathan, Delicious and Dunn showed less benefit in this trial. Initial responses were obtained with Bartlett pears, with Elberta, Triumph and Carmen peaches, and with President plums. Much earlier leaf development was induced in 3-year-old Granny Smith trees by the sprays.

353. Harris, R. W., and Griggs, W. H.
The effect of copper and streptomycin on russeting of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 155-66, bibl. 11, illus.

The results of this 2-year study show that copper dusts applied for fire blight control did not cause the fruit russeting present in the 3 orchards under observation. The specific factors responsible were not determined. Regardless of treatment, however, the longer the fruit was protected by bagging during the blossoming and blight control, the less russet developed. The effectiveness of bagging in preventing russeting is considered to be due largely to protection from unfavourable climatic conditions, although there was no apparent correlation between weather conditions at the time of copper applications and the incidence of russet. Only 2 spray treatments definitely increased russeting, namely a spray containing DDT + a basic cupric zinc sulphate complex + wettable sulphur, and a heavy application of tri-basic copper sulphate. Dusting with streptomycin appeared to have some protective action against russeting, although spraying did not; this protection may have been due to the bentonite carrier used in the dust.—Univ. Calif., Davis. [See also *H.A.*, 25: 2602.]

Viruses.

(*See also* 445m, 5231.)

354. Harris, R. V., and Posnette, A.
The production and distribution of virus-free clones of fruit trees at East Malling.
From summary *Pap. 14th int. hort. Congr.*, *1955*, Scheveningen, *see note p. 4*.

Methods of obtaining virus-free material, namely heat treatment and propagation from young shoots, are discussed. Indicator plants used for apples, pears and *Prunus* are noted. Tests show virus infection to be widespread among apples, pears and quinces. *Prunus* rootstocks and varieties have also been tested by inoculating a range of indicators. The production of virus-free rootstocks, on which scion "mother trees" can be propagated, has been started and mother trees of cherry varieties have already been made available to nurserymen.—East Malling Res. Stat.

355. Atkinson, J. D.
Virus diseases of fruit trees, identification and methods of checking spread.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Phenomena which can be used for the diagnosis of particular virus diseases are discussed. Among viruses mentioned are plum mosaic, apple mosaic, stony pit, and green crinkle and ring spot of apple. The value of roguing and selecting is stressed.—Fruit Res. Stat., Auckland, D.S.I.R., N.Z.

356. Mulder, D.
The indexing of rootstocks and graftwood of the apple for the presence of the rubbery wood virus disease using the variety Lord Lambourne as an indicator.
From summary *Pap. 14th int. hort. Congr. 1955, Scheveningen, see note p. 4*.

Two methods of testing for infection were used: (1) bending the 2-year-old stems, and (2) testing the wood by the phloroglucine lignin reaction at 3 levels of the stem. The second method proved far more reliable. None of the sources of graftwood of Golden Delicious used was found free from rubbery wood.—Inst. Phytopath. Res., Wageningen.

357. Jenkins, J. E. E., and Storey, I. F.
Star cracking of apples in East Anglia.
Plant Path., 1955, **4**: 50-2, bibl. 5, illus.

Symptoms of a dieback observed in East Anglian apple orchards is described. In some cases fruits showed star cracking. Observations in the orchards suggest that the disorder is transmissible in graft wood.

358. Kristensen, H. R.
Furede grene hos aebletraeer. I. (**Flat limb of apple trees. I.**) [English summary, ½ p.]
Tidsskr. Planteavl, 1955, **59**: 234-51, bibl. 13, illus.

Flat limb is an infectious disease probably caused by a virus which may occur in several strains. The disease is transmissible by all forms of grafting. Its incubation period varies from 8 months to 5 years or more, the variation being probably due to differences in virulence of the virus, possibly also to differences in rootstocks and certainly to differences in growing conditions, which have a great influence on symptom expression. In all the transmission experiments there has not been a single case where the flat limb virus showed a downward movement from the place of grafting. The disease was found to occur spontaneously in several apple varieties, including Gravenstein, Signe Tillisch, Filippa, Fiery [Ildrød] Pigeon and Queen [Princess ?] Louise. Experimentally, flat limb was transmitted to Gravenstein, Bodil Neergaard, Fiery Pigeon and Ingrid Marie. The latter variety is a symptomless carrier which may be the case also with Høve Reinette. Possibly there are symptomless carriers also among other varieties and certain rootstocks, but this will have to be investigated in further experiments. So far, transmission by insects has not been proved. [Translation of author's Danish summary.]—The study was carried out in 1948-53 by the Danish Institute of Plant Pathology in co-operation with Blangstedgaard and Spangsbjerg Research Stations.

359. Berkeley, G. H.
Virus-free sour cherry and sweet cherry nursery stock in Ontario, Canada.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

A description is given of the virus-free certification scheme for sour and sweet cherry stocks and of its results for nurserymen to date in Ontario.—Plant Path. Lab. St. Catharines, Ont.

360. Cadman, C. H.
Ringspot virus diseases of raspberries.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Ringspot viruses of raspberries are seed transmissible and cause local lesions on *Datura* and french bean and symptoms on solanaceous plants reminiscent of tobacco ringspot. Similar viruses are found infecting many local weeds. No insect vector has been discovered but plants appear to become infected through their roots.—Scot. hort. Res. Inst. Mylnefield.

Bacteria.

(*See also* 445q.)

361. Clayton, C. N.
Stop fire blight.
Res. and Fmg, 1954, **12**(3/4): 10, illus.

Three sprays of 100 p.p.m. streptomycin applied during blossoming reduced by 90% the death of spurs and terminal shoots or branches of Golden Delicious caused by fireblight. The death rate in the controls was 50%. The first spray should be applied at late pink bud, the 2nd 5-6 days later and the third when the petals start falling or 5-7 days after the 2nd. [See also *H.A.*, 25: 2625.]

362. Šneĭder, Ju. I.
A bacterial disease of stone fruits in the Krasnodar region. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 67-8.

A disease observed mainly on apricots, similar to shot hole of stone fruits, was found to be caused, not by *Clasterosporium carpophilum*, but by a new pathogen named *Pseudomonas caucasicum*. The symptoms on leaves, branches and fruit are described and further study of the disease and its control is proposed.

Fungi.

(*See also* 445a, f, g, w, 525.)

363. Eide, C. J.
Fungus infection of plants.
Annu. Rev. Microbiol., 1955, **9**: 297-318, bibl. 84.

This review covers recent literature on the stimuli to penetration, factors affecting penetration and infection, penetration through wounds, infection processes after penetration, and infection and disease control.—Univ. Minnesota.

364. Romanko, R. R., and Heuberger, J. W.
Captan, zineb, and captan + zineb for the control of the fruit rot phase of *Botryosphaeria ribis* on apples.
From abstr. in *Phytopathology*, 1955, **45**: 466.

Rome apples were sprayed with 1·5% captan, 1·5% zineb or 0·75% captan plus 0·75% zineb during the period covered by the 4th-8th cover spray applications. Counts on picking showed 6, 9 and 7% infected fruit respectively compared with 37% in the control. After 87 days' storage at 1·5° C. the figures were 3, 8 and 19% respectively compared with 45% in the control.

365. Corke, A. T. K.
Bitter rot of apples: I. Branch inoculations with *Gloeosporium perennans* and *G. album*.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 164-8, bibl. 6.

Monthly inoculations of branches of Cox's Orange Pippin with *Gloeosporium perennans* and *G. album* were made at Long Ashton from June 1953 to June 1954. Inoculations with mycelium of *G. perennans* were successful throughout the year. Inoculations made with spore suspensions were, however, generally successful only in November and December. All inoculations made with *G. album* were ineffective except in July-September, when a small proportion induced short-lived, non-sporing cankers. [Author's summary.]

366. Byrde, R. J. W., and Corke, A. T. K.
The role of eradicant fungicides in the control of apple canker: III. A supplementary note.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 162-3, bibl. 3.

The sporulation of *Nectria galligena* on cankers treated with 0·3% phenyl mercury chloride in the autumn was reduced for a maximum period of about 18 months, after which normal sporulation was re-established. [Authors' summary.—For earlier work see *H.A.*, 22: 22: 3600 and 25: 323.]

367. Meeuwse, P.
James Grieve-kanker op de zeekleigronden.
(James Grieve canker on sea clay soils.)
Fruitteelt, 1955, **45**: 802-3, illus.

Trees of James Grieve often show symptoms of die-back, followed by the appearance of canker spots. There was no apparent effect of rootstock, but the symptoms occurred on soils with impeded drainage. Another cause is loss of top-soil structure, which may be due to Ca deficiency, lack of humus, and unfavourable sand/silt proportion. The structure may be restored by the application of organic matter and by growing winter cover crops.

368. Taylor, J.
Apple black rot in Georgia and its control.
Phytopathology, 1955, **45**: 392-8, bibl. 21, illus.

Black rot infection, which is a ripe-rot type of disease caused by *Physalospora obtusa*, could occur throughout the season from bud break until harvest. Symptoms on leaves, sepals and fruit are described. In combination with sanitary measures, captan gave economic control of the fruit rot and leaf spot when applied at 6- or 8-day intervals from the pre-pink stage to petal fall, and then at fortnightly intervals.—Georgia Mountain Exp. Stat., Blairsville.

369. Buddenhagen, I. W.
Various aspects of *Phytophthora cactorum* collar-rot of apple trees in the Netherlands.
[Dutch summary.]
Tijdschr. PlZiekt., 1955, **61**: 122-9, bibl. 9, illus.

The symptoms of collar-rot on Cox's Orange Pippin are described. Isolates of *Phytophthora cactorum* and *P. syringae* from pear and apple fruits were markedly pathogenic to Cox trunks. Inoculation of cut branches showed that *P. syringae* was most pathogenic at 5°, 10°

and 15° C., while the optimal temperatures for *P. cactorum* development were 20°, 25° and 30° C.

370. OLGYAY, M., AND LEHOCZKY, J.
Almafalisztharmat elleni védekezési kísérletek. **(Trials on the control of apple mildew.)**
[English and Russian summaries ¾ p. each.]
Agrártud. Egy., 1952 (issued 1954), **16**(3, Part 1): 115-29, bibl. 21, illus.

Chemical treatment, even when the trees were cleaned the previous autumn, did not give adequate control of apple mildew, *Podosphaera leucotricha*, but a combination of tree cleaning, pruning out the infected shoots and repeated spraying showed promise. It is recommended that the pruning should take place in the spring between the bud burst and pink bud stages, and that 2 pre-blossom sprays also applied at bud burst and pink bud stages should be followed by 3-5 post-blossom treatments. Of the chemicals used lime sulphur + 0·5% $FeSO_4$ gave the highest percentage of control.

371. SHAY, J. R.
Apple scab resistance.
From summary in *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

In a backcross breeding programme genes of Asiatic *Malus* species are being incorporated individually into the chief North American apple variety types. The most advanced lines horticulturally are those containing a single gene from *M. floribunda* 821. Resistance genes are being evaluated against diverse strains of *Venturia inaequalis*.—Purdue Univ., Lafayette, Indiana. [See also *H.A.*, 24: 2545f.]

372. HIRST, J. M., AND OTHERS.
The origin of apple scab epidemics in the Wisbech area in 1953 and 1954.
Plant Path., 1955, **4**: 91-6, bibl. 15, illus.

With the aid of an automatic volumetric spore trap and a recording rain gauge, tests were carried out in the spring in 1953 and 1954 to discover whether *Venturia inaequalis* conidia or ascospores were more common, and which were more likely to cause first infection. No conidia were caught in either year between March and May. There was no indication that twigs with infected foliage in the autumn became more infected in the following spring than twigs with healthy foliage. There was some evidence that the numbers of ascospores caught was influenced by the time of day at which rain fell. Results suggested that there was a heavy release of ascospores from mid-March until the end of May. First lesions were found about 3-4 weeks after the first large quantity of spores was liberated following budburst. The earliest infections were on the lower leaf surfaces. Although there was a long rainless period in both years, asci continued to mature, and large quantities of spores were liberated with the first considerable rain. High concentrations of ascospores were trapped early in the season, and in some years infection might occur at bud-burst. It is concluded that sprays should either be applied earlier than at present or be able to eliminate established infections.—Rothamsted exp. Stat., Harpenden, and N.A.A.S., Cambridge.

373. MARSH, R. W.
A summary of apple scab control experiments at Long Ashton, 1944-54.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 153-61, bibl. 16.

The materials assessed included thiram and thiocarbamates, phenyl mercury preparations, substituted quinones and quinolines, glyoxalidines and captan. Large volume and air-flow methods of application were compared, using lime sulphur.

374. KEARNS, H. G. H., MARSH, R. W., AND MORGAN, N. G.
Spray application problems: XIX. Further field experiments on the control of apple scab by small-volume sprays.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 134-7, bibl. 5.

Field trials on methods of application of lime sulphur and captan for apple scab control are described. Results showed that large-volume run-off spraying with either material at "normal" concentrations gave virtually complete control, but lime sulphur applied in this way caused extensive russeting on Cox. Scab control was unsatisfactory after 5 small-volume air-flow applications at 50 gal. per acre using 1 or 2% lime sulphur or 0·1% captan, but an increase in either the number of applications or the fungicide concentration to 4 times "normal" gave a high degree of control. [From authors' summary.]

375. BYRDE, R. J. W., CLARKE, G. M., AND HARPER, C. W.
Spraying experiments against apple scab at Long Ashton, 1954.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 147-52, bibl. 10.

The substitution of captan (0·075%) for lime-sulphur (0·75%) in the post-blossom spray programme on the apple variety Cox's Orange Pippin resulted in a significant reduction in fruit russet, an improvement in fruit size, and a significantly higher incidence of apple mildew. Both treatments afforded an excellent control of apple scab. [Authors' summary.]

376. HUTTON, K. E.
The use of organic mercury compounds for black spot control in pome fruits.
Fruit World, Melbourne, 1955, **56**(9): 31.

The eradicant qualities of organic mercury fungicides have been studied when used as post-harvest sprays at high concentrations for black spot [*Venturia inaequalis*]. In the first year, heavily infected Golden Delicious leaves sprayed before leaf-fall with phenyl mercuric chloride at 0·3% did not develop any of the overwintering stage of the fungus. In the second year Granny Smith was sprayed with phenyl mercuric chloride, which at rates of 0·3% and 0·1% eradicated the fungus from the leaves. Other organic mercury compounds, used at effective concentrations, caused severe leaf injury, but no permanent injury to bark or buds. In 3 small orchards encouraging results were obtained by sprays, but eradication was not complete owing to inadequate isolation. [For an earlier report see *H.A.*, 25: 1459.]

377. REICH, H.
Die Vorteile und Nachteile der wichtigsten organischen Fungizide bei der Fusikladiumbekämpfung. **(The *pros* and *cons* of the chief organic fungicides used against scab.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

The substances considered are Thiuram (TMTD) introduced as Pomarsol, Zinc dimethyldithiocarbamate introduced as Fuklasin, Rhodandinitrobenzol introduced as Nizit, organic mercury compounds such as Aaventa, and Captan introduced as Orthocide 50.—Obstbauversuchsanst. Jork, Germany.

378. YAMADA, S., AND KISHI, K.
Studies on chemical control at the dormant stages of diseases of fruit trees. Preliminary report. I. Effect of dormant sprays against black spot disease of Japanese pear, caused by *Alternaria kikuchiana* Takana. 1. [Japanese with English summary ½ p.]
J. hort. Ass. Japan, 1955, **24**: 41-50, bibl. 24, illus.

Tests with spore formation *in vivo*, spore germination *in vitro* and field spraying were used in studies on dormant spray control of black spot of pears. A mixture of lime sulphur and sodium pentachlorophenate was more effective than separate sprays of each in all 3 tests. Sprays of Riogen (a mercurial fungicide), sodium pentachlorophenate and a mixture of pentachlorophenol and machine oil emulsion did not retard spore germination, but were much more effective against spore formation and gave some control in the field. Lime sulphur applications were unsatisfactory. Bordeaux mixture effectively inhibited spore germination, but showed less effect against spore formation and was not effective in the field.

379. A., P.
Oïdium sur poiriers. (***Oidium* on pear trees.**)
Rev. romande Agric. Vitic., 1955, **11**: 72.

A block of Comice pears was seriously attacked by *Oidium*, which reduced the commercial value of the fruits. Application of potassium permanganate after the appearance of the fungus prevented further attack to a large extent, but did not completely stop it.

380. GILMER, R. M.
Evaluation of various fungicides and application schedules in the control of diseases of cherry nursery stocks.
Plant Dis. Reptr, 1955, **39**: 762-70.

The results of 5 years of fungicide tests for control of powdery mildew (*Podosphaera oxyacanthae*) and leaf spot (*Coccomyces hiemalis*) of cherry nursery stocks demonstrated that both timing of the initial application and choice of fungicide were critical for disease control. Under normal western New York conditions, the initial application should be made 10 to 14 days after bud break, i.e., usually about June 10 to 15. A combination of Actidione (2 p.p.m.) and sulphur (2 to 5 lb. per 100 gal. water) afforded outstanding control of both diseases when used in a 4-application schedule with applications at 14-day intervals. Actidione (2 p.p.m.) in the same schedule gave excellent leafspot control, but control of powdery mildew, while comparable to that obtained with copper fungicides, was not highly satisfactory. Copper fungicides at rates as low as 0·4 lb. actual metallic copper per 100 gal. usually gave good control of leaf spot but poor control of powdery mildew. None of the remaining fungicides tested gave acceptable control of both diseases in a 4-application schedule. [Author's summary.]—N.Y. St. agric. Exp. Stat., Geneva.

381. KÜHNEL, W.
Die Cylindrosporium-Krankheit an Süss- und Sauerkirschen. (***Cylindrosporium* disease on sweet and sour cherries.**)
Dtsch. Gartenb., 1955, **2**: 277-9, bibl. 8, illus.

Leaf spot of stone fruits caused by *Cylindrosporium padi* has been reported from several European countries and is thought to be a potential danger to cherries. The fungus and its life-history are described; two physiological strains have been discovered. Recommended control measures, based on American experience, consist of at least 3 sprays of a sulphur material plus Cu, applied as soon after petal-fall as possible.

382. ZWINTZSCHER, M.
Über die Reaktion von Sorten der Steinobstarten *Prunus cerasus* und *Prunus avium* auf die Infektion mit *Monilia*. (**The reaction of *Prunus cerasus* and *P. avium* varieties to *Monilia* infection.**)
From summary *Pap. 14th int. hort. Congr.* Scheveningen, *see note p. 4*.

Work at the Max Planck Institute of fundamental importance to future investigations on the control of *Monilia* infections is described.—Voldagsen, Germany.

383. ANGELL, H. R.
Brown rot of stone fruits. III. Incidence on the Phillips Cling peach on light and heavy soil types in 1955.
J. Aust. Inst. agric. Sci., 1955, **21**: 180-2, bibl. 6.

In 1955 heavy rain fell in the Shepparton district shortly before harvesting. On the lighter soils waterlogging occurred, brown rot soon developed and severe fruit drop and defoliation ensued. On heavier, comparatively impermeable soils the water remained on the surface, there was less brown rot and leaf shedding was restricted to a few trees.—C.S.I.R.O., Canberra. [See also *H.A.*, 25: 2643.]

384. CHASSET, H.
La lutte contre la cloque du pêcher. (**Control of peach leaf curl.**)
Arboric. fruit., 1955, No. 20, p. 14.

Peach trees (J. G. Hale) were sprayed in March with an acidic emulsion of DNC to control peach leaf curl [*Taphrina deformans*]. The treatment was compared with applications of copper oxysulphate. By mid-May the DNC-treated trees showed good vegetative growth without leaf curl; 40% of the leaves of the Cu-sprayed trees were attacked. In another experiment the DNC emulsion effectively controlled San José scale [*Aspidiotus perniciosus*] on pears in the first year of treatment.

385. BREMER, H.
Wirkung eines Blattfleckenpilzes auf die Konstitution von Baumkronen. (**Effect of a leaf spot fungus on the constitution of tree crowns.**)
Sydowia, 1954, **8**: 275-7, from abstr. in *Rev. appl. Mycol.*, 1955, **34**: 464.

Investigations on the association between increased transpiration and defoliation of the crowns of almond trees attacked by *Clasterosporium carpophilum* in the Ankara district of Turkey are reported. The intensity of transpiration was found to be approximately equal in spotted and healthy leaves from the same severely diseased tree, whereas in those from mildly infected neighbouring trees the rate was as much as 62·5% slower after half-an-hour. There are two possible explanations of the phenomenon: either the fungus enhances transpiration, not only in the infected leaves but throughout the crown, or it establishes itself more readily on trees with freely transpiring foliage. The former hypothesis is regarded as the more plausible of the two.

386. Geard, I. D.
Progress report on berry fruit spraying trials.
Tasm. J. Agric., 1955, **26**: 243-53, illus.

Experiments on raspberries and loganberries over the past 2 seasons have shown that bordeaux mixture, TMTD, captan and ferbam were equally effective against anthracnose (*Elsinoë veneta*) and spur blight (*Didymella applanata*); DNOC was effective as a green tip spray but was severely phytotoxic when used later. Raspberry leaf rust (*Phragmidium rubi-idaei*) was only controlled by spray schedules containing a bordeaux spray at white bud. A green tip spray of bordeaux or DNOC reduced leaf spot on blackcurrants (caused by *Septoria ribis*). Further control was obtained by TMTD and captan applications when the fruit was half grown.

387. Poapst, P. A., and others.
Mold control tests.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, pp. 10-11.

Strawberries. In 1953 various fungistats were tested for ability to reduce mould on strawberries packed in quart baskets. When the berries were held at 75° F. it was found that sodium orthophenylphenate dip at 0·05%, peracetic acid dip at 0·3%, or perchloroethylene vapour at 1:20 × 10^3 volume liquid to volume air space doubled the shelf life. At the same temperature trichloroethylene vapour at 1:15 × 10^3 concentration trebled shelf life. Sorbic acid was ineffective. In 1954 cyclic treatment with trichloroethylene vapour (i.e. changed every 2 days with provision for the fungistat to escape) at a concentration of 1:20 × 10^3 trebled shelf life at a temperature of 40° F. and produced a 33% increase in the mould-free period at 71° F. This concentration, however, was marginal to fruit tolerance levels. *Peaches.* Fruit inoculated with *Rhizopus* strains and *Monilia fructigena* spores were treated with trichloroethylene vapour at concentrations of 1:15 × 10^3 and 1:25 × 10^3 volume liquid to volume air space for 10 hours and then stored at 40° and 75° F. Owing to prior infection trichloroethylene treatment failed to control the brown rot organisms, but holding at 40° F. appeared to be an excellent deterrent of mould. *Apples.* Calcium propionate, with pH adjusted to neutrality and used as a 2% dip, reduced mould wastage by 44% at the end of the storage period and after 10 days' ripening period. Sodium propionate proved very phytotoxic. The sodium salt of orthohydroxybiphenyl, applied as a 3% distilled water dip to Linda apples, was very effective in reducing wastage during storage but produced a chemical scald.—Cent. exp. Fm, and Sci. Serv., Ottawa.

388. Moore, M. H., and Tew, R. P.
Greenhouse testing of fungicides against *Botrytis* rot (grey mould) of strawberry and other soft fruits.
J. hort. Sci., 1955, **30**: 213-19, bibl. 9.

Ripening fruits were dipped in or dusted with the fungicide to be tested, inoculated with a spore-suspension of *Botrytis cinerea* and incubated in a moist chamber. Several chemicals were compared, used as aqueous dispersions or as dusts; at 0·5% of active ingredient thiram was superior to captan or salicylanilide. The dispersions were more effective than 10% dusts.—E. Malling Res. Stat., Kent.

389. Kirby, A. H. M., Moore, M. H., and Wilson, D. J.
Strawberry *Botrytis* rot (grey mould) control: a field trial of captan at East Malling.
J. hort. Sci., 1955, **30**: 220-4, bibl. 7.

In a 2-year trial, a schedule of 2 post-blossom sprays of captan was carried out on irrigated and non-irrigated plots of Royal Sovereign. The fungicide applications significantly reduced the percentage of rotted fruits, and increased total and marketable crops, especially on irrigated plots. Marketable crops in the 2 years were increased by about 30%. In this trial irrigation by hose increased losses due to rotting on plots receiving no fungicide; yields on fungicide-sprayed plots were higher than those on sprayed but non-irrigated plots.—E. Malling Res. Stat., Kent.

390. Marsh, R. W., Martin, J. T., and Crang, A.
The control of *Botrytis* rot (grey mould) of strawberries, and the effects of fungicide spray residues on the processed fruit.
J. hort. Sci., 1955, **30**: 225-33, bibl. 6.

In a preliminary field trial with Climax, 3 sprays, applied between blossom and harvest, of 0·25% captan or 0·4% thiram reduced *Botrytis* rot on the fruits to about ⅓ of that on corresponding unsprayed plots. Captan at 0·125% was less efficient; 0·2% tecnazene and 0·2% salicylanilide sprays gave no control. The maximum level of captan residue recorded on ripe fruit was 19 p.p.m.; this did not affect the flavour or ascorbic acid content of the fresh fruit. Canned strawberries from thiram-sprayed plots were markedly tainted. In canned fruit from captan-sprayed plots tainting was less noticeable. No deleterious effect was noted in jams made from any of the sprayed fruits. [From authors' summary.]—Long Ashton Res. Stat., Univ. Bristol.

391. Cheal, W. F.
The South Hampshire strawberry problem.
Agriculture, Lond., 1955, **62**: 331-4, bibl. 7, illus.

Trials on red core-infested land at Botley show that the soil structure of the Hedge End soil series shares with this fungus disease the responsibility for the poor strawberry crops obtained by local growers. [Author's summary.]

392. Wilhelm, S.
Verticillium wilt of the strawberry with special reference to resistance.
Phytopathology, 1955, **45**: 387-91, bibl. 27, illus.
Verticillium wilt resistance.
Calif. Agric., 1955, **9**(9): 8, 15, illus.

A method for rapidly eliminating strawberry plants susceptible to verticillium wilt is described. Factors for verticillium wilt resistance appear to be dominant and quantitative; they appeared to be strongly linked to factors responsible for glossy foliage and powdery mildew resistance.—Univ. Calif., Berkeley. [See also *H.A.*, 25: 342.]

393. CABRAL, M. C. DE M.
Quelques observations zur l'efficacité de diverses bouillies cupriques dans le combat contre le mildiou de la vigne. (**Notes on the efficacy of some copper mixtures against vine downy mildew.**)
Bull. Off. int. Vin, 1955, Vol. **28**, No. 294, Suppl., pp. 164-8.

In the first year of experiments on the principal vine varieties of the Torres Vedras district of Portugal 0·4% cupric oxide and 1% bordeaux mixture gave the best control of vine downy mildew, followed by a course of treatment consisting of 3 applications of cupric oxide preceding 4 of bordeaux mixture at the above-mentioned strengths, and then by 0·4% copper oxychloride.

394. SILVESTRE, M. DE O.
Notes sur les bouillies cupriques en viticulture. (**Notes on the use of copper mixtures in vine growing.**)
Bull. Off. int. Vin, 1955, Vol. **28**, No. 294, Suppl., pp. 157-63.

Acid, neutral and alkaline bordeaux mixtures prepared by addition of the lime to the copper sulphate (direct) and vice versa (indirect) were tested against vine downy mildew (*Plasmopara viticola*) on 3 varieties for 5 years. The main conclusions were, (1) the precipitates of alkaline mixtures are at least as soluble as those of neutral mixtures; (2) indirect alkaline mixtures adhere at least as well as neutral and much better than acid mixtures; (3) treatments should begin when the fruit is set in March; (4) intervals between treatments should be 7-8 days, or up to 10 in dry weather; (5) the number of treatments should generally exceed 10; (6) treatments should be frequent during rapid growth; (7) wetters and stickers do not have much effect on the coverage or adherence of mixtures.—Estac. vitivinic. Beira Litoral, Anadia, Portugal.

Nematodes.

(*See also* 207, 445p, 549, 550.)

395. DUDDINGTON, C. L.
Fungi that attack microscopic animals.
Bot. Rev., 1955, **21**: 377-439, bibl. 131.

Much space is devoted to fungi predacious on nematodes. Years of research are, however, needed before this type of biological control of eelworms could be adopted as a practical measure. [See also *H.A.*, 24: 2830.]

396. ADAMS, R. E.
Control of an ectoparasitic nematode injurious to deciduous fruit trees.
Abstr. in *Phytopathology*, 1955, **45**: 464.

Young peach trees growing in soil treated with 30, 36, or 60 oz. of benzene hexachloride (BHC) per 100 sq. ft. grew better than untreated trees, apparently owing to the demonstrated control of *Xiphinema* sp., an ectoparasitic nematode. Treatment with 90 oz. BHC proved toxic to the trees. Except in the case of the 90 oz. treatment, there was a significant negative correlation between tree growth and nematode population. Injury to established apple trees by this nematode is a contributing factor to the condition known locally as "pout". One season's treatment with BHC improved the appearance of such apple trees, reduced nematode population in the soil, and caused no abnormal flavour in the fruit.

397. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med varmtvandsbehandling af jordbaerplanter med henblik på bekaempelse af jordbaerål. (**Experiments on the hot water treatment of strawberry plants for eelworm control.**)
Tidsskr. Planteavl, 1955, **59**: 155-8, illus.

The method of hot water treatment of strawberry runners developed in England (46·2° C. for 10 minutes) gave satisfactory control of *Aphelenchoides ritzemabosi* and *A. fragariae* without undue injury to J. A. Dybdahl plants, a susceptible variety widely grown in Denmark. Ydun and Deutsch Evern also stood up to the treatment reasonably well. The apparatus used is described and illustrated.

Mites.

(*See also* 406, 408, 445n, 879.)

398. GEORGALA, M. B.
The biology of orchard mites in the Western Cape Province.
Sci. Bull. Dep. Agric. S. Afr. **360**, 1955, pp. 13, illus.

Following biological notes control recommendations are made for *Bryobia praetiosa* and *Tetranychus bimaculatus*. Against the former, winter sprays on apples and pears should consist of 4 gal. winter oil emulsion, 4 gal. lime sulphur and 92 gal. water, and on plum 3:3:94. Spring and early summer treatment for apple, pear, plum and peach should consist of parathion applied shortly after the peak period of egg hatching and repeated fortnightly. Against red spider 2 summer sprays of parathion should be applied to all fruit species at an interval of 10 days, beginning when the mites reach an average of 3-4 per leaf; they should be repeated if the population builds up again. The rates are those for *Bryobia*, namely, either 1½ lb. 15% wettable powder per 100 gal. or an equivalent amount of emulsifiable concentrate.

399. KEARNS, H. G. H., MORGAN, N. G., AND WILKINS, A. H.
Spray application problems: XVIII. Observations on the application of chlorbenside for the control of the winter eggs of the red spider mite (*Metatetranychus ulmi* Koch).
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 131-3, bibl. 1.

p-Chlorbenzyl *p*-chlorphenyl sulphide (chlorbenside) applied at 0·05 and 0·02% concentration either as a dispersible powder or as a benzol emulsion gave a 99% kill of the winter eggs of *Metatetranychus ulmi* when applied at the pink bud stage of the apple Worcester Pearmain. At earlier stages of bud development the ovicide provided little or no control. [Authors' summary.]

400. Armstrong, T., Dustan, G. G., and Downing, R. S.
A comparative study of three acaricides.
A.R. Ont. Ent. Soc., 1954, 1955, pp. 5-17, bibl. 8, illus.

Greenhouse and field experiments on PCPBS, Elimite (chlorocide) and ovotran are described. In the field trials the 3 acaricides gave about the same high degree of control of *Metatetranychus ulmi* on apple, peach and plum. One or two early-season sprays shortly before and after bloom often gave good commercial control for the season. Because of the relative ineffectiveness against adults, sprays applied to well-established populations in July often did not give good control for two weeks, unless a quick-acting acaricide such as Aramite was added. No foliage or fruit injury was caused in Ontario in limited field trials on apple, peach and plum. In British Columbia Ovotran applied at the pink stage caused serious injury to Bartlett pear fruitlets and slight injury on some varieties of apple. Elimite at the pink stage occasionally caused slight injury but PCPBS did not. Elimite applied in mid-June caused lenticel corking on a small percentage of the fruit in one Red Delicious apple orchard. PCPBS applied in July caused a lenticel type of injury on Newtown apple but not on Delicious and, in a second orchard, about 2% defoliation of Jonathan apple but not of McIntosh. [From authors' summary.] —Vineland Stat., Ont.

401. Asquith, D.
Acaricide tests on apple in 1954.
J. econ. Ent., 1955, **48**: 329-30, bibl. 1.

In an apple orchard in Pennsylvania 2 formulations of Aramite and the experimental acaricide F.W.293 (a w.p. formulation containing 25% of α-trichloromethyl-4,4′-dichlorobenzhydrol) had the longest residual effectiveness against *Tetranychus telarius* and *T. schoenei*. Systox also performed satisfactorily and at harvest showed no detectable residues.

402. Bravenboer, L.
Chemische en biologische bestrijding van spint (*Tetranychus urticae* Koch). (**Chemical and biological control of red spider.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 672-80, illus.

Tetranychus urticae, which is the main pest of fruit grown under glass, may be controlled by organic phosphorus compounds. Some strains have shown a degree of resistance to these compounds, but not to other groups of acaricides. *Stethorus punctillum* has proved to be an effective predator of red spider. It is susceptible to almost all organic P and chlorinate hydrocarbon insecticides, but is unaffected by specific acaricides and ovicides (e.g. Aramite, PCPS).—Proefstat. Groent. Fruit. Glas, Naaldwijk.

403. Meltzer, J.
Het onderzoek van acariciden en spintoviciden in het laboratorium. (**Laboratory research on acaricides and red spider ovicides.**) [English summary 2 pp.]
Tijdschr. PlZiekt., 1955, **61**: 130-42, bibl. 11, illus.

Several acaricidal and ovicidal compounds were tested in aqueous solutions for their action against eggs, larvae and adults of *Tetranychus urticae*. Parathion, malathion, Diazinon and Karathane were least effective ovicidally. Larvae were more susceptible to Karathane than the adults; larvae and adults were equally susceptible to malathion, while with diazinon and parathion the larvae were less susceptible than the adults. The ovicidal and larvicidal activity of sulphenone was low, but that of DPS was slightly better. CPCBS was immediately effective when the eggs were immersed in it; CPBS was much less effective than CPCBS as a dip though the dry deposit was highly ovicidal. Tedion was strongly ovicidal both immediately on dipping and residually.

404. Flik, H. M.
Results with tedion in fruit-culture.
From summary *Pap. 14th int. hort. Congr.* 1955, Scheveningen, *see note p. 4.*

The successful effects of tedion on red spider eggs and larvae are noted, as also its lack of phytotoxic effect on vegetation.—N.V. Philips-Roxane, Weesp, Netherlands.

405. Barr, H. E., Clark, P. J., and Jacks, H.
Selenium in apples—the effect of applications of Selocide to the tree and to the soil.
N.Z. J. Sci. Tech., Sect. B, 1955, **37**: 119-25, bibl. 5.

Analysis of apples both from unsprayed trees and from those sprayed with Selocide each spring over a number of years revealed a significant annual variation in the selenium content of the fruit. Annual spring spraying caused no progressive increase in the selenium content of the fruit, and no increase resulted from the accumulation of spray run-off in the soil. On the assumption that the response from two experimental orchards treated for several years would be representative of the response from orchards throughout the country, if similarly treated, the statistical analysis showed that 95% o orchards would produce fruit containing not more than 0·092 p.p.m. of selenium. Excessive spray applications in one season brought about an increase in the selenium in the fruit harvested in two subsequent seasons. Applications of Selocide to the soil did not increase the selenium content of the fruit. Satisfactory control of red-mite species on apples was obtained until midsummer with two spray applications of Selocide in the spring, and an increase in mite population did not occur until late summer. Records made over several years during the summer showed that this treatment reduced the mite population per leaf to 3-11 mites, while controls carried 37-398 mites. [Authors' summary.]—Dom. Lab., Wellington.

Insect pests.

(*See also* 162, 445j, r, v, 1285b.)

406. Ullrich, D. E.
A study of combinations of insecticides for the control of three apple pests in western New York.
Diss. Abstr., 1955, **15**: 947-8, being *Publ.* 11923 of 143 pp.

Some combinations of DDT, DDD, parathion and malathion were tested for control of codling moth (*Carpocapsa pomonella*), red-banded leaf roller (*Argyrotaenia velutinana*), European red mite (*Paratetranychus* *pilosus*) and 2 spotted mite (*Tetranychus bimaculatus*) on McIntosh apples. The DDT parathion combination was the best of those tested. Diazinon gave very good control of codling moth, red-banded leaf roller and European red mite, Chlorobenzilate, DDT/malathion, and DDT/parathion gave excellent mite control in special sprays. The inclusion of lime in a malathion spray considerable reduced malathion deposits. Malathion emulsions caused spotting of McIntosh apples in all 3 test years.

407. Turica, A.
Nuevo elemento de lucha contra el agusanamiento de la manzana. (New means of control of apple fruit pests.)
Idia, 1954, No. 82, pp. 16-17.

E.605, lead arsenate and several chlorinated hydrocarbons were tested against *Cydia pomonella*, *C. molesta*, *Oiketicus kirbyi* and *Ceratitis capitata* on young apples of 3 varieties in small-scale trials at Buenos Aires provincial experimental farm in 1952/54, 6 applications being made in most cases. E.605 (0·1%) gave the best results, namely, 1·4% infested fruit compared with 67% in the controls.

408. Neiswander, R. B.
Insect pests of strawberries in Ohio.
Res. Bull. Ohio agric. Exp. Stat. **763**, 1955, pp. 31, bibl. 18, illus.

Recommendations are made for the control of *Ancylis comptana fragariae* (life history described), *Paria canella*, *Colaspis brunnea*, *Tyloderma fragariae*, white grubs, *Philaenus leucophthalmus* and *Tetranychus bimaculatus*. Brief mention is made of a number of minor pests. The drawings of the the pests by R. W. Rings are noteworthy.

409. Bennett, S. H.
The biology, life history and methods of control of the leaf curling plum aphid *Brachycaudus helichrysi* (Kltb.).
J. hort. Sci., 1955, **30**: 252-9, bibl. 3, illus.

Hatching and reproduction of the aphid were shown to occur before bud burst on damson. Satisfactory control may be obtained with BHC and DDT applied at any time during dormancy and up to bud-burst. Experiments in 1954 showed that BHC sprays applied even after extensive leaf curling had occurred gave complete control.—Long Ashton Res. Stat., Univ. Bristol.

410. Putman, W. L.
Effect on the green peach aphid of sprays of DDT against the oriental fruit moth.
J.econ. Ent., 1955, **48**: 333, bibl. 1.

Observations made at the Vineland Station, Ontario, ndicate that in areas where green peach aphid, *Myzus persicae*, is injurious, DDT applied for the control of oriental fruit moth, *Grapholita molesta*, on late peach varieties might be expected to reduce the frequency and ntensity of aphid infestations.

411. Princ, Ja. I.
Eradication of phylloxera without destroying the vine. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 27-32, bibl. 1.

On the basis of considerable experimentation in Moldavia and elsewhere it is recommended that where the phylloxera has not penetrated the soil deeply autumn or spring applications of the following fumigants should be made to a depth of 20-30 cm: (*a*) 120 g. of distillation residues of dichlorethane per sq. m. between the rows and 30 g. around each root collar; (*b*) 100 g. of dichlorethane + 50 g. of paradichlorbenzene per sq. m. with 20 g. of paradichlorbenzene around the root collar; or (*c*) 80-100 g. of carbon bisulphide + 40-50 g. of paradichlorbenzene per sq. m. with 20 g. of paradichlorbenzene around the root collar. Where the pest has penetrated deeply it is suggested that 2-tiered fumigation should be carried out at a depth of 1 m. in the autumn and 20-30 cm. in the spring with the same materials at similar rates as recommended for the single treatments. The fumigants applied at the above-mentioned rates had a stimulating effect on both the growth and yield of vines. Reference is also made to equipment needed for large-scale operations and to the properties of the chemicals, in particular the distillation residues of dichlorethane.

412. Miljčevskiĭ, E. A., and Lugovikov, L. A.
A trial on the eradication of phylloxera without destroying the vines under conditions of the Anap region. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 33-5.

Of materials used as soil fumigants for phylloxera control, only distillation residues of dichlorethane were effective. When this material was applied at 250-300 g. per sq. m. in 3 tiers on chernozem soils, or at 200 g. per sq. m. in 2 tiers on stony soils, with additional application of 60 g. around the root collar of each vine, phylloxera was completely eradicated to a depth of 280 cm. To prevent damage to the vines the upper tier, at a depth of 20 cm, should be fumigated in the summer after locating the seat of infestation, and the middle and lower ones, at depths of 60 and 100 cm., in the autumn. The need for apparatus suitable for large-scale application is stressed.

413. Nikolaev, P. I.
A contact method of phylloxera control without destroying the vines. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 35-40.

As the existing chemicals were not found satisfactory for phylloxera control, a new preparation was developed at the Institute "Magarač" and named provisionally "Magarač emulsion No. 6". It consists of 120 g. of 50% DDT powder, 67 g. mineral oil, 8 g. caustic potash and 80 g. anabasine sulphate to 1 l. water. The chemistry of the components is discussed and the preparation of the emulsion is described. "Magarač 6" is applied to the soil in water (1:100) at a rate of 20-40 l. per sq. m. or 200-400 cu. m. per ha. It was also found to be effective as a spray against leaf phylloxera and other pests of deciduous and citrus fruits. A cheaper formulation, designated No. 8, containing 120 g. of 5% DDT powder, 80 g. mineral oil, 80 g. distillation residues of dichlorethane and 20 g. hard caustic alkali to 1 l. water was found to be equally effective and did not affect the flavour of the grapes or the wine.

414. Kirjuhin, G. A.
Testing of insecticides against phylloxera under conditions of Odessa province. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 5, pp. 40-4, bibl. 9.

Contact and systemic insecticides were found to be unsuitable for phylloxera control but certain insecticidal-fumigants, notably distillation residues of dichlorethane, were effective. The material applied at the previously recommended low rate was not satisfactory, nor were single large treatments, as they damaged the roots of vines, but split applications of a total of approximately 450 g. per sq. m. gave very good results. It is recommended that distillation residues of dichlorethane should be applied to a depth of 20-25 cm. at 120 g. per sq. m. after locating the infestation, an additional 20 g. being applied around the root collar, and the treatment repeated in the autumn at 160 g. per sq. m. to a depth of 100 cm. and then again in the spring at 120 g. per sq. m. to a depth of 25-30 cm. with 20 g. around the root collar.

415. Howitt, A. J., and Bullock, R. M.
Control of the garden centipede.
J. econ. Ent., 1955, **48**: 246-50, bibl. 2, illus.

In southwestern Washington several chlorinated hydrocarbons failed to control the garden centipede or symphylid, *Scutigerella immaculata*, in newly-planted strawberries and raspberries. Using a special method for screening compounds for symphylid control, 18 materials were applied of which parathion gave the most promising results. In further trials parathion, at 5 lb. actual toxicant per acre, applied in July when the symphylids were near the soil surface, gave outstanding control in large plots of cauliflower and cabbage.

416. Böhm, H.
Der "Blitzwurm"—ein Birnenbaumschädling. **(*Agrilus sinuatus*, a pear pest.)**
Pflanzenarzt, 1954, **7**(11): 2-3, from abstr. in *Z. PflKrankh.*, 1955, **62**: 457.

In recent years the sinuate pear tree borer has caused damage in certain parts of Austria, especially to young pear trees. Contact or arsenic insecticides should be applied when the pest starts its maturation feed, and again 8-10 days later. The importance of sanitary measures is emphasized.

417. Flemion, F., and Ledbetter, M. C.
Penetration and destruction of plant tissues during feeding by *Lygus lineolaris*.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

A discussion of the widespread damage done by *Lygus* species on 50 different economic crops. Techniques are described which are used with the help of radioisotopes to determine the action of *Lygus* in the plants attacked. —Boyce Thompson Inst., Yonkers, N. York.

418. Vasseur, R., and Schvester, D.
Essais toxicologiques de laboratoire contre la mouche méditerranéenne des fruits, *Ceratitis capitata* Wied. (Dipt. *Trypetidae*). **(Toxicological experiments in the laboratory against the Mediterranean fruit fly.)**
Ann. Épiphyt., 1955, **6**: 215-27, bibl. 7.

Zeidane, lindane, parathion, diazinon and rotenone were compared. Parathion wettable powder gave the best results, having good immediate and residual effects. In general, mixtures were no better than their components used alone.

419. Blunck, H., and Martini, C.
Das Massenauftreten des Baumweisslings (*Aporia crataegi* L.) **(The mass incidence of *Aporia crataegi*.)**
Gesunde Pfl., 1954, **6**: 264-6, from abstr. in *Z. PflKrankh.*, 1955, **62**: 673.

In Western Germany the larvae of *Aporia crataegi* occasionally destroy the entire foliage of damson trees, while other fruit trees are less seriously damaged. Parathion preparations are recommended for control of the pest.

420. Patterson, N. A., and MacLellan, C. R.
Control of the codling moth and other orchard pests with ryania.
A.R. Ont. Ent. Soc., 1954, 1955, pp. 25-32, bibl. 5.

In the control of codling moth ryania has compared favourably with DDT and has not caused outbreaks of other pests by interfering with natural control during the two years it has been under trial in Nova Scotia [see also *H.A.*, 25: 3780]. Though activated ryania (synergized with *n*-propyl isomer) is much more toxic to some insects than the untreated ryania, with the codling moth and other orchard pests there were only slight differences. In Nova Scotia, where usually there is only one generation per year, the best control of the codling moth was obtained from three applications of ryania beginning when the first eggs hatched and repeated at seven- to ten-day intervals. However, good control was obtained with two applications in many commercial orchards. Similar results were obtained in Ontario but it was necessary to make six applications during the season. In British Columbia, four applications were necessary to control the two generations of the moth and the amount of ryania per acre was more than double that used in Nova Scotia and Ontario. [From authors' summary.]—Sci. Serv. Lab. Kentville, N.S.

421. Smith, L. C.
DDT resistant codling moth . . . a report on the 1954/55 control trials.
J. Dep. Agric. S. Aust., 1955, **59**: 12-15, illus.

In 1954 a strain of codling moth resistant to DDT threatened apple growers in the Paracombe district. Several insecticides were tested in the 1954/55 season, and both malathion and diazinon gave effective control of codling moth. Parathion did not give particularly good control in the trial, but the same schedule gave good commercial control in the district. Micronized phenothiazine was more effective during the cooler months than at higher temperatures; it left an undesirable greenish-black residue on the fruit. It is recommended that malathion applications at 0·05-0·075% should be made at 14-day intervals from petal-fall.

422. Michelbacher, A. E., and Hitchcock, S.
Outbreak of the filbertworm on walnuts in Northern California.
J. econ. Ent., 1955, **48**: 340-1, bibl. 1.

No chemical control of filbertworm, *Melissopus latifer-*

reanus, has yet been developed. Early harvesting and rapid curing of walnuts are helpful, but under conditions of severe infestation they are inadequate to keep injury below an economic level.

423. Mühlmann, H.
Mauerbienen und Sackträgerraupen als Weinbergsschädlinge. (*Osmia leucomelaena* and *Sterrhopteryx hirsutella* as vine pests.)
Weinberg u. Keller, 1955, **2**: 15-18, bibl. 2, illus.

The damage done by *Osmia leucomelaena* was too slight to warrant control measures. *Sterrhopteryx hirsutella*, which occasionally causes foliage injuries, was successfully controlled with 0·03% E605.

424. Kajiura, M.
Breeding work on new varieties of Japanese chestnut resistant to chestnut gall wasp (*Dryocosmus kuriphilus* Yasumatsu).
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Six new varieties have been selected and are under trial or resistance and growth at Prefectural Experiment Stations in Japan.—Hort. Sect., Nat. Inst. agric. Sci., Hiratsuka, Japan.

425. Brown, E. B.
Dock sawfly is threatening apples again.
Grower, 1955, **44**: 385, 387, illus.

The second generation of dock sawfly (*Ametastegia labrata*) larvae have caused damage to the apple crop n the Eastern counties of England this year, especially n young, arable orchards. Applications of DDT at the ime of emergence (August or September) around the base of each tree and on any docks in the neighbourhood are recommended for control.

426. Zeck, E. H.
The pear and cherry slug (*Caliroa limacina*).
Agric. Gaz. N.S.W., 1955, **66**: 294-5, illus.

Notes are given on the biology of the sawfly *Caliroa imacina* and on control of the larvae with DDT or lead rsenate sprays. Plum, quince and hawthorn foliage s sometimes attacked as well as that of pear and cherry.

Birds.

427. Mills, D. R.
Electric fences versus birds.
Grower, 1955, **44**: 761.

olythene tubing containing a live wire threaded into urrant bushes and garden peas has successfully kept irds away. Electric wire fencing has also kept mice rom seedling peas.

Rodents.

(*See also* 445t.)

428. Banta, E. S.
How to prevent rodent damage.
Amer. Fruit. Gr, 1955, **75**(11): 8-9, illus.

dvice is given (1) on the control of meadow and pine ice by strychnine and zinc phosphide poison baits;) on rabbit protection by casing the trunks with wire netting or applying a repellant such as 8 lb. resin per gal. denatured alcohol; and (3) on deer protection by repellents.

Fungicides and insecticides.

(*See also* 353, 377, 445b-e, h, i, k, o, s, x, 547, 845-850, 1076, 1189.)

429. Anon.
New chemical intermediate is fungicide, insecticide.
Agric. Chemic., 1955, **10**(9): 81.

Cyanuric chloride (2,4,6-trichloro-1,3,5-triazine) has produced a derivative 2,4-dichloro-6-(o-chloroanilino)-s-triazine which is effective against early and late tomato blight, apple scab, celery early blight, muskmelon leaf spot, onion foliage diseases, leaf diseases of ornamentals, tomato anthracnose, dollar spot and turf diseases. Cyanuric chloride has also been used in the preparation of triallyl cyanurate, which, when dissolved in acetone, gave 100% control of black bean aphid.

430. Fuchs, W. H., and Kunz, H. D.
Die innertherapeutische Wirkung von Cyanamid. **(The chemo-therapeutic action of cyanamide.)**
Naturwissenschaften, 1954, **41**: 20, from abstr. in *Z. PflKrankh.*, 1955, **62**: 699.

In laboratory trials calcium cyanamide was found to be absorbed by the roots and translocated in the plants without injury in sufficiently large quantities to show a distinct insecticidal action on *Doralis fabae* and other aphids as well as on insect pests of other families. The chemical was applied in an aqueous solution.

431. Anon.
Les fongicides organiques de synthèse a base de "zinèbe" en arboriculture fruitière. **(Organic fungicides based on zineb in tree fruitgrowing.)**
Arboric. fruit., 1955, No. 20, pp. 17, 19.

In France experience with dithane (which is based on zineb) has shown the possibility of substituting it for copper sprays on apples and pears at certain stages of growth. The organic spray is much less harmful to yield, and may be used with safety over a wider range of temperature and humidity than copper sprays. There was no basis for asserting that red spider build-ups followed dithane sprays. It is possible that zineb + S sprays may be used in the control of scab and mildew.

432. Tanaka, S.
Spraying experiments with fungicides for peaches. I. Experiments on spray injury from copper fungicides. [Japanese with English summary ⅔ p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 137-49, bibl. 17, illus.

In field and pot experiments carried out from 1934 to 1943, spring and summer sprays of wettable sulphur caused no injury to peach trees but gave little control of anthracnose or bacterial shot-hole. Zinc lime sprays during the growing period also caused no injury and even had a stimulating effect on growth of peaches in sandy soil and prevented copper spray damage. The effect of zinc lime on diseases, however, was difficult to assess. Among the copper sprays tested, copper phosphate caused the least injury, and when this was mixed with zinc lime no damage occurred. Cuprous oxide, copper oxychloride, copper oxalate and basic copper phosphate caused marked spray injury, while bordeaux mixture, even at very low concentrations and mixed with zinc sulphate, caused severe injury such as shot-hole and defoliation.

433. Miller, L. P.
Some examples of the use of radioisotopes in studies of pesticide action.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

By the use of labelled toxicants the interaction has been studied between fungus spores and sulphur, mercury, silver, cerium, ferric dimethyldithiocarbamate, 2-heptadecyl-2-imidazoline and 2,3-dichloro-1,4-naphthoquinone. Isotopes have also been used to study the feeding habits of such insects as *Lygus oblineatus*.—Boyce Thompson Inst., Yonkers.

434. Martin, J. T., and Pickard, J. A.
Spray application problems: XIII. Determination of captan deposits: progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 83-9, bibl. 10.

Captan deposits on the fruits of strawberry, apple and pear have been determined. Three applications to strawberries of captan at 0·125 and 0·25% gave deposits of the order of 10 and 20 p.p.m. respectively. One application, late in the season, of captan at 0·1% to apples and pears gave deposits of approximately 1 p.p.m., falling to negligible values at harvest time. Captan persisted well under the rainfall conditions during the trials. [Authors' summary.]

435. Morgan, N. G., and Martin, J. T.
Spray application problems: XV. Copper and DDT deposits from large and small volume application.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 97-105, bibl. 5, illus.

Experiments are described on the application of copper to potato plants using large and small volume hydraulic and small volume air-flow spraying, and of DDT to apple trees using lance and air-flow methods. The deposits, including those from drift, determined by chemical analysis of the sprayed plants are discussed in relation to the methods of application used. [Authors' summary.]

436. Thome, H. J.
Methoxychlor residue tolerance.
Market Grs' J., **84**(9): 22.

Methoxychlor received a tolerance of 14 p.p.m. for nearly 50 fruits and vegetables from the Federal Food and Drug Administration. The use of this insecticide in pest control is discussed.

437. Harris, H. J.
Colorimetric determination of ethyl 4,4′-dichlorobenzilate (chlorobenzilate) as a spray residue.
J. agric. Food Chem., 1955, **3**: 939-41, bibl. 4.

An analytical method is described for the microdetermination of the acaricide chlorobenzilate as a spray residue. The method has been further developed to determine the compound in the presence of DDT. Chlorobenzilate residue determination by this method has been successfully used with apples, pears, peaches, cantaloupes and strawberries.—Geigy agric. Chemicals, Bayonne,

Spray apparatus and technique.

(*See also* 4451, n, 1074.)

438. Hoare, E. R.
Small volume spraying machines used in horticulture.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The function of a spray is the break up of a fluid and its dispersal over a wide area. The problems involved are discussed. They concern the amount of liquid required, the best droplet size, the amount of deposition to be achieved and the choice of material. The economic aspect of different machines in relation to the application of large volumes is considered. The factors governing the future use of the small volume sprayer in orchards are set out.—N.I.A.E., Silsoe.

439. Patterson, R. E., Raleigh, S. M., and Anderson, P. M.
An engineering analysis of the boom versus the boomless sprayer.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 65-7.

The boomed sprayer was found to be more certain in action and less affected by factors militating against even coverage in both pest and weed control.

440. Besemer, A. F. H.
Spray materials for low volume spraying.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author points out that low volume spraying has its particular problems regarding spray materials and its particular demands with regard to formulation, favourable spray conditions etc. The following are considered in this connection: (1) The influence of water and relative humidity on the effect of low volume spraying, (2) the influence of the wetting agent in low volume spraying, and (3) the decrease of selectivity resulting from the use of small droplets in concentrated spraying for weed control.—Plant Protection Service, Wageningen.

441. Thiem, H.
Stand des Sprüh-u. Nebelverfahrens im Obstbau von Deutschland. (**The treatment of fruit trees in Germany by low-volume and mist spraying.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Observations are recorded on the co-operative spraying of fruit trees on agricultural holdings by low-volume applications and of both modern orchards and single trees by mist applications, especially for cherry fruit fly and codling moth control.

442. Stobwasser, A.
Untersuchungen über die Möglichkeit der Verneblung von fungiziden Pflanzenschutzwirkstoffen. (**Studies on the mist application of fungicides.**)
Z. Aerosolforsch., 1954, **3**: 461-81, from abstr. in *Z. PflKrankh.*, 1955, **62**: 704.

In laboratory trials mist application of several fungicides produced residues containing sufficient active material to be effective against a number of test fungi. Mist application of fungicides and insecticides combined was found to be practicable and to yield residues of satisfactory rain resistance. The method of producing the mist is described.

443. Friedrich, G., and Bauckmann, M.
Vergleichende Untersuchungen über Spritzen, Sprühen und Nebeln im Obstbau. **(Comparative studies on conventional, concentrate and mist spray applications in orchards.)**
Dtsch. Gartenb., 1955, **2**: 249-52, illus.

Results are reported of one year's trials in the course of which apple orchards (standard trees) were treated with conventional and concentrate sprays and mist for the control of pests and scab. The data, which are specified for individual pests though not for the chemicals used, show that concentrate sprays resulted in the best fruits. The conventional sprays failed to achieve a thorough coverage of the top of the trees, and the mist proved inadequate for scab control. The effect of various wind velocities on the success of the three types of treatment is also briefly discussed.—Martin-Luther Univ., Halle-Wittenberg.

444. Kahl, E., and Wenzl, H.
Über die Brauchbarkeit der Oberflächenspannungsmessung zur Bestimmung der Netzfähigkeit von Spritzbrühen. (**On the use of surface tension measurement for determining the wetting capacity of sprays.**) [English summary 10 lines.]
PflSch. Ber. Wien, 1955, **15**:1-7, bibl. 2.

Experiments have shown that plant protection sprays of equal surface tension showed different wetting results on the same test plants which included pear, root crops and cabbage. Sprays with a surface tension of 23(-28) dyn. cm^{-1} or less showed a good wetting capacity in all tests.—Bundesanstalt PflSch., Wien.

Noted.

445.

a Anon.
Red core of strawberries.
Essex Fmrs' J., 1955, **34**(6): 25-6.
Control and varietal susceptibility in U.K.

b Besemer, A. F. H.
Ontwikkelingen op het gebied van de ziekten bestrijdingsmiddelen. (**Developments in insecticides and fungicides.**) [English summary ¾ p.]
Meded. Dir. Tuinb., 1955, **18**: 646-57.
A review.

c Burchfield, H. P., and Schechtman, J.
Method of measuring the crystallization rate of bordeaux mixture.
Contr. Boyce Thompson Inst., 1955, **18**: 215-23, bibl. 10.
For determining rate of deterioration.

d Casida, J. E.
Isomeric substituted-vinyl phosphates as systemic insecticides.
Science, 1955, **122**: 597-8, bibl. 6.

e Clark, E. L., Johnson, G. A., and Mattson, E. L.
Evaluation of O,O-dialkyl S-alkylthiomethyl phosphorodithioates.
J. agric. Food Chem., 1955, **3**: 834-6, bibl. 13.
As systemic insecticides.

f Clarke, G. M., and Corke, A. T. K.
Sources of variability in sampling blackcurrants for leaf spot.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 199-201, bibl. 3.

g Delhaye, R.
Armillariella mellea, sur vignes en serres. (***Armillariella mellea* on glasshouse vines.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*
And how, for its control, *Trichoderma lignorum* can be encouraged.—Stat. Rech. Sci. Vitic., La Hulpe, Belgium.

h Furmidge, C. G. L.
Spray application problems: XVI. The evaluation of an average droplet diameter in sprays.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 106-17, bibl. 3.

i Furmidge, C. G. L.
Spray application problems: XVII. The measurement of spray droplet size in the field.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 118-30, bibl. 7, illus.

j Götz, B.
Die Engerlingsbekämpfung im Weinbau. **(White grub control in vineyards.)**
Weinberg u. Keller, 1955, **2**: 69-73.

k Häfliger, E.
Die Anwendung von Diazinon im Obst- und Gartenbau. **(The use of diazinon in orchard and garden.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*
A phosphoric ester only slightly toxic to animals.—Geigy A. G., Basle, Switzerland.

l Hammer, O. H., and Amstutz, F. C.
Apparatus for more rapid vaporization of methyl bromide.
Down to Earth, 1955, **11**(2): 11-13, bibl. 5, illus.

m Helton, A. W.
Symptoms of virus ring spot and related disorders in the sweet cherry orchards of Idaho.
Plant Dis. Reptr, 1955, **39**: 623-7, illus.

n Huisman, H. O., van der Veen, R., and Meltzer, J.
A new acaricide, 2,4,5,4′-tetrachloro-diphenylsulphone.
Nature, 1955, **176**: 515-16, bibl. 5.
A Dutch product with the trade name of Tedion V. 18. [For earlier accounts see *H.A.*, 25: 1537, 3761 and 26:403, 404.]

o Jacks, H.
Incompatibility of spray materials.
Supplement to *Orchard. N.Z.*, 1955, **28**(8), pp. 8.
A fuller table than that noted *H.A.*, 25: 413q.

p KLINKENBERG, C. H.
Nematode diseases of strawberries in the Netherlands.
Plant Dis. Reptr, 1955, **39**: 603-6.
A review of investigations, including work on *Pratylenchus penetrans* in relation to black-root rot and its control. [See also *H.A.*, 24: 1369.]

q MINISTRY OF AGRICULTURE, LONDON.
Crown gall.
Adv. Leafl. Minist. Agric. Lond. **253**, revised 1955, pp. 6, illus.
Bacterium tumefaciens, *B. rhizogenes* and *Corynebacterium fascians*.

r MÜLLER, F. P.
Die wichtigsten Blattlausarten in Landwirtschaft und Gartenbau. **(The most important aphid species in agriculture and horticulture.)**
Flugbl. dtsch. Akad. LandwWiss., Berlin **18**, 1954, pp. 26. illus.
Biology, symptoms of host plants, predators and control.

s MUNRO, J. W.
The Crop Protection Products Approval Scheme. I. How the scheme was founded.
ASHWORTH, DE B.
Idem. II. The work of the Scheme.
KING, J.
Idem. III. The role of the Government Chemist in the administration of the Scheme.
J. sci. Food Agric., 1955, **6**: 481-3, 483-6, 486-9.

t REICH, H., AND VAGT, W.
Merkblatt für die Feld- und Wühlmausbekämpfung. **(Field mouse and vole control.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 233-31, illus.
[See also *H.A.*, 25: 2713.]

u RICHTER, H., AND OTHERS.
50 Jahre Deutscher Pflanzenschutzdienst. **(50 years of plant protection service in Germany.)**
NachrBl. dtsch. PflSchDienst., 1955, **7**: 65-99, bibls., illus.
Development of the service discussed in a series of articles.

v SMITH, O. J.
Western grape leaf skeletonizer.
Calif. Agric., 1955, **9**(8): 7, illus.
Promising observations on biological control of *Harrisina brillians*.

w STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med tåge- eller koncentratsprøjtning til frugttraeer. **(Trials on mist concentrate sprays for fruit trees.)**
Tidsskr. Planteavl, 1955, **59**: 349-51.
Satisfactory control of apple scab by concentrate sprays. [See also *H.A.*, 25: 2636.]

x STRINGER, A., WOODCOCK, D., AND SKERRETT, E. J.
Insecticidal activity and chemical constitution: analogues and isosteres of DDT.
Ann. appl. Biol., 1955, **43**: 366-78, bibl. 19.

y TUKEY, L. D.
"Siamese" fruits trouble growers 1954.
Science for the Farmer, 1955, **3**(1): 7, illus.
Fruit doubling in peach and sour cherry briefly discussed. [See also *H.A.*, 25: 288.]

z WHITE, D. G., AND WHATLEY, B. T.
A method to measure cracked apples and tomatoes.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 289-90, illus.
A map measure used to measure lengths of cracks.

WEEDS AND WEED CONTROL

General

(*See also* 26, 523i, l, r.)

446. LOOMIS, W. E., AND OTHERS.
Basic studies.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 158-76.

The increasing interest in basic work with herbicides is shown by the large number, viz. 52% abstracts published in this section. In an abstract on the kinetics of inhibition of growth by herbicides a hypothesis is presented which relates the rate of inhibition of growth to the concentration of the herbicide used. Other studies reported concern absorption, translocation and persistence of herbicides; dormancy and germination of weed seeds; development, spread and distribution of weeds; and weed competition.

447. DANIELSON, L. L. (Chairman), AND OTHERS.
Report of the Research Coordinating Committee of the Northeastern Weed Control Conference for 1955.
Suppl. to Proc. 9th annu. Mtg. N.E. Weed Control Conf. 1955, New York, pp. 4-56.

This report represents a compilation of experimental and practical trial results which may be used as a guide in establishing methods for local practical and experimental weed control trials. Materials, rates and methods of application are suggested for extensive and/or trial use, and problems needing more work are indicated in crops which include: carrot, parsnip, parsley, dill, celery, brassicas, spinach, lettuce, asparagus, tomato, pepper, pea, bean, onion, cucumber, squash, pumpkin, cantaloupe, watermelon, beetroot, turnip and swede; strawberry, grape, raspberry, blackberry and blueberry; apple, cherry, peach and plum; turf; and woody nursery crops, gladiolus, perennial and annual flowers. Weed control on roadsides, control of aquatic, herbaceous perennial and biennial weeds and soil sterilization are considered. The various sections are summarized in a tabulated form and present a convenient means of ready reference.

448. PROEBSTING, E. L.
Weed sprays as a substitute for cultivation in California orchards.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Some 100,000 acres in California are now treated with herbicides instead of being cultivated. Soil structure has improved under the process and there is better utilization of horizon Ap. Situations suitable and unsuitable for such treatment are discussed.—Davis, Calif.

449. STUTE, K.
Drohen der Bienenzucht Gefahren durch Anwendung wuchsstoffhaltiger Unkrautbekämpfungsmittel? **(Is beekeeping threatened by the application of hormone herbicides?)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, 7: 152-7, bibl. 19.

Extensive tests showed that hormone herbicides properly applied are no danger to bees.—Bundesforsch-Anst. f. Kleintierzucht, Celle.

Particular weeds.

(*See also* 523b, d, f, j, m, p, q.)

450. DUNHAM, R. S., AND OTHERS.
Annual, winter-annual and biennial weeds.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 35-48.

Of the 31 abstracts received 14 report on the control of wild oats (*Avena fatua*) with 23 herbicides or their formulations. Promising results were obtained with IPC, CIPC, dalapon, TCA, DNBP and MH. Other weeds considered in this section include crabgrass (*Digitaria sanguinalis*), *Polygonum* spp. and *Bromus* spp.

451. FRIESEN, H. A., AND OTHERS.
Toadflax and other perennial herbaceous weeds.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 27-34.

Of 16 abstracts received 12 deal with toadflax (*Linaria vulgaris*) control. Among the effective herbicides used against this weed were: 2,4-D, CMU, PDU, borate + 2,4-D and borascu. Field horsetail (*Equisetum arvense*) was controlled by given rates of dalapon, borate + 2,4-D, Karmex FW, boron + CMU, amino triazole and 2,4-D; poverty weed (*Iva axillaris*) by 2,4-D; wild garlic (*Allium vineale*) by 2,4-D and MH; and cattail (*Typha latifolia*) by dalapon, TCA and CMU.

452. BUCHHOLTZ, K. P., AND OTHERS.
Quack or couch grass.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 1-9.

Twenty abstracts report on the effectiveness of many herbicides, applied by various methods, against couch grass (*Agropyron repens*). Foliage applications of MH, dalapon and amino triazole at from 2 to 8 lb. per acre gave from slight to excellent control when followed by tillage. Practically complete control was obtained by soil applications of 20 to 50 lb. per acre of CMU, 80 to 193 lb. of TCA, 50 to 100 lb. of dalapon or about 1,200 lb. of boron-containing compounds.

453. SAND, P. F., AND OTHERS.
Hoary cress, Russian knapweed and bur ragweed.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 25-6.

Five abstracts were received. Against hoary cress (*Cardia draba*) a brush killer at 2 lb. per acre, amino triazole at 3, 6 and 16 lb. per acre and 2,4-D at 3-10 lb. per acre were reported to be effective. Russian knapweed (*Centaurea repens*) was controlled by 40 lb. per acre of 2,4-D applied in the autumn; boron and boron-chlorate mixtures also gave very good kills. Bur ragweed (*Franseria sp.*) stands were effectively reduced by sodium chlorate at 640-1,280 lb. per acre, sodium pentaborate at 960-1,600 lb. per acre and 2,4-D-boron compounds at 640-960 lb. per acre.

454. DERSCHEID, L. A., AND OTHERS.
Field bindweed.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak. pp. 14-17.

In 7 abstracts the effects of several forms of MCPA, 2,4-D and 2,4,5-T applied to *Convolvulus arvensis* under varying conditions and different seasons are noted. Of these, formulations of 2,4-D were the best, and low level treatments in both autumn and spring were less variable in their effects than single high level treatments. SES, sodium chlorate, borascu and certain other compounds were found to give satisfactory results under some but not all conditions.

455. DERSCHEID, L. A., AND OTHERS.
Leafy spurge.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 18-24.

The 10 abstracts submitted indicate that for leafy spurge (*Euphorbia esula*) control soil sterilants and cultural practices are the most promising. Suitable soil sterilants are given and their rates, methods of application and effectiveness are described. The best results, which appeared to give 100% elimination, were obtained with boron–2,4-D mixtures applied in summer at 2½ lb. per sq. rod.

456. HARITONOV, V. N.
Control of broomrape in vegetable crop rotation. [Russian.]
Sad i Ogorod, 1955, No. 8, pp. 29-31.

Observations in the Talass province of the Kirgiz SSR have shown that watermelon, melon, marrow cucumber and tomato were very susceptible to broomrape attack; potato, cabbage and carrot moderately so; and onion, garlic and beetroot resistant. It is recommended that the susceptible crops should follow perennial grasses and should not be grown on the same land within 7 years. Raising seed plants of these species in nutrient blocks and planting them out when 60 days old was found to increase their resistance. The inclusion of rice in the crop rotation, where practicable, is also effective against broomrape whose seeds are destroyed by inundation. A biological method of broomrape control by the broomrape fly [*Phytomyza orobanchiae?*], however, appears to be the most promising [see also *H.A.* 25: 2787], and to preserve the overwintering forms of the insect it is suggested that the dry, infested stems should be lightly dug into the soil under cover.

457. TERPÓ, A.
A napraforgó-vajfű (*Orobanche cumana* Wallr.), hazai terjedése és irtása. **(The dissemination and control of sunflower-broomrape in Hungary.)** [Russian and German summaries ½ p. each.]
Agrártud. Egy., 1951 (issued 1953), **15**(2, Part 2): 99-103, bibl. 6.

Orobanche cumana, now spreading in Hungary, attacks not only sunflower but also tomato and tobacco. Control measures used successfully in the Soviet Union are described.

458. PORTSMOUTH, G. B.
Weedkillers.
A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 42-3.

Borascu 44, a sodium borate dust, gave no control of couch grass (*Panicum repens*) on paths when applied at rates of up to 2 tons per acre. In trials against ribbon grass (*Phalaris arundinacea*) in ravines complete control was obtained with the following 4 treatments: (1) 50 lb. TCA plus 200 gal. water plus 0·5% teepol per acre sprayed at high volume with a second application after 2 weeks; (2) 50 lb. TCA plus 100 lb. sodium chlorate plus 200 gal. water plus 0·5% teepol per acre sprayed at high volume followed by a high-volume spray of 50 lb. TCA plus 200 gal. water plus 0·5% teepol after 2 weeks; (3) 100 lb. TCA plus 6 gal. PCL (sodium chlorate liquid concentrate) plus 150 gal. water plus 0·5% teepol per acre sprayed once at high volume; (4) a single dusting with borascu 44 at 4840 lb. per acre.

459. FLETCHALL, O. H., AND OTHERS.
Johnson grass and Bermuda grass.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 10-11.

The 4 abstracts submitted show that dalapon at 20-30 lb. per acre was very effective against Johnson grass, *Sorghum halepense*. Results with TCA were more variable than with dalapon, but the former was less toxic to field crops planted the year following treatment.

Control of aquatic weeds.

(*See also* 523g.)

460. HUCKINS, R. K.
Aquatic weed control studies in New Jersey.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 519-34, bibl. 5.

A lengthy report describing 3-years' testing of many herbicides, without giving any definite recommendations for the control of submerged aquatic weeds. Limited work on cattail, *Typha latifolia*, shows that this emergent water weed can be controlled with sodium chlorate-metaborate and possibly with CMU pellets.

461. RIGG, H. H.
The effect of herbicides on a series of aquatic plants.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 535-44, bibl. 3.

The herbicides tested were sodium arsenite, ammonium thiocyanate and 2,4-D. Sodium arsenite and 2,4-D proved relatively satisfactory herbicides at a concentration of 10 p.p.m. The former was effective against *Elodes canadensis*, *Myriophyllum verticillatum* and *Ceratophyllum demersum*, and the latter against *M. verticillatum*, *C. demersum* and *Nymphaea odorata*. Ammonium thiocyanate was ineffective at 100 p.p.m. The regenerative power of aquatics renders many herbicides useless. Translocation of inorganic compounds was found to take place only in the xylem and that of 2,4-D only in dicotyledons.

462. FRESHWATER, I. T., AND MOLLER, R. B.
Weed control in irrigation channels.
Cane Grs' quart. Bull., 1955, **19**: 39-41, illus.

Of 3 new chemicals tested in 1954/55 AK100 and borascu were unsatisfactory. The third, polyborchlorate, a non-selective mixture of sodium borates and sodium chlorate of limited solubility, gave excellent results when applied as a powder at the rate of 15-25 lb. per 100 sq. ft. mixed with the first few inches of soil. The difficulty of fixing the material on steep sloping drain sides has yet to be overcome.

463. BAUMGARTNER, L. L.
A case history of a misapplication of CMU for aquatic weed control.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 559-62, illus.

Trees on the bank of a lake in a park in Ohio were killed by CMU applied to the water for weed control. The cause is considered to be movement of the chemical with underground drainage water. Of the trees affected Cottonwood, *Populus deltoides*, succumbed first and ash last. Large trees were more susceptible than small ones.

Control of woody plants.

(*See also* 523k.)

464. MEYERS, W. A., ALLEN, W. W., AND BEATTY, R. H.
Effect of ATA on woody plants.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 445-50.

An area of mixed brush vegetation was treated with amino triazole in the summer at 6-12 lb. per 100 gal., using about 150 gal. of spray per acre. The plants most affected were poison ivy, white ash, black oak, scrub oak and hickory. Dormant basal sprays of 20 lb. of amino triazole per 100 gal. per acre gave 50% kill of black oak and hickory.

465. MEYERS, W. A., ALLEN, W. W., AND BEATTY, R. H.
A comparison of field tests of standard and new brush killer formulations.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 433-8.

From results of trials on the control of 5 woody species with several commercial formulations of 2,4,5-T ester it is concluded that there are differences in the kill of woody plants when different formulations are used even though the formulations have the same amount of acid and the same esters.

466. ANON.
Brushwood control on roadside verges.
Rds and Rd Constr., 1955, **33**: 107-8, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-107-8.

A proprietary product containing both 2:4-D and 2:4:5-T effectively killed bramble, briar, gorse, broom, bindweed, rose-bay, willow-herb and most saplings except oak, ash, beech, maple and rhododendron. Hawthorn seedlings are killed but the hedges are fairly resistant. A foliage spray is effective for brambles and briars if applied between mid-May and mid-July; at other times it should be applied to basal bark or cut stumps. Birch, poplar and willow saplings ($<1\frac{1}{2}$ in. diam.) and dense brushwood need basal-bark treatment with the compound mixed in oil; for larger saplings and heavy gorse, painting or spraying of the freshly-cut stumps is necessary.

467. Portsmouth, G. B.
Treekillers.
A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 43-4.

Trials were carried out with two tree killers, Trioxone (a liquid containing 2,4,5-T esters equivalent to 5 lb. acid per gal.) and ammonium sulphamate applied in 3 ways, namely, (1) pouring a solution of the chemical into a frill girdle, or into holes bored round the trunk. (2) felling the tree and applying the solution to the cut surface of the stump, and (3) foliar spraying. The results suggest that 2,4,5-T is an effective tree killer at much lower concentrations than is ammonium sulphamate, and that gum trees are relatively resistant to both chemicals. From 50 to 520 c.c. Trioxone in diesel oil (7:45) was effective against *Grevillea robusta* and *Erythrina lithosperma*, but had no effect on *Eucalyptus* sp.

468. Hyder, D. N., and Sneva, F. A.
Effect of form and rate of active ingredient, spraying season, solution volume, and type of solvent on mortality of big sagebrush, *Artemisia tridentata*.
Stat. tech. Bull. Ore. agric. Exp. Stat., **35**, 1955, pp. 16, bibl. 4.

In trials with one ester of 2,4,5-T and two esters of 2,4-D in 1952 and 1953 6 applications were made at approximately fortnightly intervals between the second half of April and the first half of July at 1 and 2 lb. acid equivalent and 3 and 6 gal. per acre. Conclusions reached were: (1) In general, the propyleneglycol butyl ether ester of 2,4,5-T was more lethal than either of the 2,4-D esters but its relative efficacy, which was higher at the beginning of the season, fell gradually and finally dropped below theirs. (2) The propyleneglycol butyl ether ester and the butyl ester of 2,4-D were equally efficacious. (3) *Poa secunda* is a good indicator of the spraying season, 2 phases of its life cycle corresponding with the beginning and end of the period of peak effectiveness of spraying. (4) Taking the 2 herbicides together and averaging the 6 applications, 1 lb. acid equivalent per acre gave 78% mortality and 2 lb. 87% at the average volume rate, namely 4½ gal., while 3 gal. per acre gave 77% and 6 gal. 87% at the average acid equivalent rate, namely 1½ lb. (5) Solvents of water, diesel oil and diesel oil emulsion were equally effective. [See also *H.A.*, 24: 3737.]

469. Srivastava, R. C., and Sharma, S. L.
Chemical control of *Croton sparsiflorus* Mor.
Proc. Indian Acad. Sci., 1955, **42**: 123-7, illus.

Two spray applications of 2,4,5-T at 0·2 or 0·4% concentration killed *C. sparsiflorus* in about 20 days while treatments with 2,4-D and MCPA were ineffective.

470. Worley, D. P., Bramble, W. C., and Byrnes, W. R.
The effect of volume, concentration and point of application of 2,4,5-T in the basal treatment of bear oak.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 439-44.

In further placement tests in Pennsylvania 2,4,5-T in kerosene applied in the dormant season to the root collar, or base of stem and root collar, was again most effective on *Quercus ilicifolia* [see also *H.A.*, 24:2577]. High volume, low concentration sprays were superior to low volume, high concentration ones.

Weed control in fruit crops.

(*See also* 309, 489.)

471. Hemphill, D. D., and others.
[Weed control in] fruits.
Res. Rep. 11th annu, N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 117-18.

Vines (1 abstract): CIPC at 10-14 lb. per acre or CMU at 2 lb. per acre gave more effective weed control than dinitro fortified diesel oil. CMU caused chlorosis on leaves of new transplants and should only be used in mature vineyards. *Raspberries* (1 abstract): Weeds were effectively controlled by SES at 4 lb. and Sesin and Natrin at 4 and 6 lb. per acre each. *Strawberries* (2 abstracts): Treatments with the longest residual effect were Sesin at 6 and 8 lb. and Natrin at 6 lb. per acre all giving good weed control up to 6 weeks following application.

472. Carlson, R. F.
Fall applications with CIPC on three strawberry varieties for control of common chickweed.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 221-2, bibl. 1.

Common chickweed (*Stellaria media*) was completely controlled by CIPC at 1·5, 2·5 and 3·4 lb. per acre, mouse-ear chickweed (*Cerastium vulgatum*) was not controlled and populations of field sorrel (*Rumex acetosella*) were reduced by 80% by the 3·4 lb. rate. The strawberry plants were tolerant of the herbicide, though some slight, temporary yellowing of the leaves occurred at the higher rates. No reduction in yield was evident and there was no visual difference in response of the varieties.—Mich. St. Coll.

473. Carlson, R. F.
Preliminary tests with CMU for weed control in established vineyards.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 209-10, bibl. 1.

In 2 established Concord vineyards in Michigan, CMU, applied as a directional basal spray at 2·5 and 5 lb. per acre in May or 7·5 to 12·5 lb. per acre in July, gave good control of most broadleaved weeds for the entire season. No visible injury could be detected on either fruit or foliage of vines.

Weed control in ornamentals and nurseries.

(*See also* 965.)

474. Mahlstede, J. P., and others.
Herbaceous weeds in woody crop plants and flowers including forest nurseries, ornamental nurseries, shelterbelts, and all others.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 119-23.

Seven abstracts were received. SES applied pre-weed-emergence at 4 lb. per acre in established nursery stock and perennial and annual flowers effectively reduced stands of both broad and narrow-leaved weeds, but injured species of *Ligustrum* and *Euonymus*. Natrin at 4 and 8 lb. per acre gave highly effective weed control throughout the season. Other promising materials for ornamental nurseries were CIPC, CMU, NIX and Karmex DW.

475. TICKNOR, R. L., AND BOBULA, P. F.
Some results with pre-emergence applications of several herbicides around rhodendrons and *Taxus*.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 211-15.

Of 9 herbicides applied pre-weed-emergence none injured the rhododendrons or yews, and CIPC at 6 lb. and CMU and its related compound Karmex W at 1 lb. per acre gave excellent weed control.—Mass. agric. Exp. Stat.

Weed control in tropical crops.

(*See also* 458, 459, 1136, 1235h.)

476. MUZIK, T. J.
Weed control in Puerto Rico.
Reprinted from *Advances Chem. Ser.*, 1955, **13**: 85-95, bibl. 60, illus.

Methods and herbicides used in Puerto Rico are described and results are compared with those from other areas. Sugar cane is the most important crop in which chemical weed control is practicable and 2,4-D is the most frequently used material. Of specific weeds nutgrass, *Cyperus rotundus*, is of particular importance and receives constant attention.

477. ALMOND, F. L., AND KING, N. J.
Weed control in sugar cane.
S. Afr. Sugar J., 1955, **39**: 559, 561, 563.

Herbicidal control of weeds was compared with cultivation and weeding in trials on N:Co. 339 begun at the South African Sugar Association Experiment Station in 1952. The highest yield (53 tons per acre), the highest sucrose per cent cane (14·71) and the second highest number of canes at harvest (2586) were produced by pre-emergence treatment with 2·9 lb. Na salt of 2,4-D per acre followed by 3 cultivations and 2 weedings. Corresponding figures for the best non-herbicidal treatment, which consisted of 2 cultivations and 2 weedings, were 48 tons, 14·67% and 2468 canes. It was concluded that: (1) weeds can be controlled either by herbicides or by cultivation and weeding; (2) if herbicides are used, the cane should be cultivated at some period to induce more extensive and deeper rooting.

478. SPENCE, T. B.
Sugar.
A.R. Kenya Dep. Agric. 1953, Vol. II, 1955, p. 194.

In a weed control experiment at Ramisi in Coast Province pre-emergence spraying gave very good control of weeds, including monocotyledons, a single application of Fernoxone, which was better than YF2618, giving almost complete control for 8 weeks. Post-emergence control alone was unsuccessful. Pre-emergence spraying had no effect on the crop, but post-emergence spraying caused some leaf burn.

Weed control in turf.

(*See also* 523e.)

479. GRIGSBY, B. H., AND OTHERS.
[Weed control in] turf.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 99-102.

Five abstracts were submitted. Those dealing with crabgrass, *Digitaria sanguinalis*, control show that in pre-emergence treatments the most effective herbicides, NP (Alanap) at 8 lb./a and DCU at 9·9-14·8 lb./a, produced some discoloration of bluegrass but did not cause permanent damage. SES at 4-8 lb./a did not discolour the turf and gave satisfactory control. In post-emergence applications PMA and KOCN were effective. Control of clover in turf was obtained by the use of endothal and Kuron [2,4,5-TP ?] at rates of 2 lb./a. A report on tolerance of turf to herbicides indicates that dalapon at 10-20 lb., amino triazole at 1·5-6 lb. and CMU at 20-40 lb. may give temporary suppression of perennial grasses, but the rates are not sufficient for permanent killing of the turf.

480. ENGEL, R. E., AND ALDRICH, R. J.
Control of annual bluegrass (*Poa annua*) in fairway-type turf.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 353-5.

Of 13 herbicides tested in New Jersey, endothal, M.H. and sodium arsenite were the most promising for *Poa annua* control in turf, with endothal eliminating almost all the clover and causing an increase in bentgrass. Early spring applications gave very consistent results.

481. MCFAUL, J. A.
Two years' test and demonstration work in turf renovation using calcium cyanamid.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 341-3.

In New York lasting weed control was obtained in the 1954 season from calcium cyanamid applications made during seedbed preparation the previous August. The chemical was applied at 40, 60 and 80 lb. per 1,000 sq. ft. and worked best when there was slight moisture in the soil and at a temperature of 70° F.

482. JAGSCHITZ, J. A., AND CORNMAN, J. F.
Persistence of clover control in putting green turf treated with endothal and 2,4,5-T.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 375-83, bibl. 1.

Results are given of 8 experiments recorded more than 1 year after treatment. An earlier report described results of 6 of the trials 15 weeks after treatment [see *H.A.*, 25: 1594]. Mowing the turf prior to treatment and the time of day of application had no significant effect on the degree of clover control or turf injury. The removal of thatch prior to application increased the effectiveness of endothal but reduced that of 2,4,5-T. Increasing the dilution of endothal from 50 to 800 gal. per acre decreased turf injury without affecting clover control, but 2,4,5-T in 400 gal. per acre appeared less effective than in 25 or 50 gal. Less injury was caused by 2,4,5-T in September than in June. Neither compound gave complete clover control but 2,4,5-T at ½ lb. per acre appeared the most satisfactory; repeated applications may be necessary if clover persists.—Cornell Univ.

483. Jagschitz, J. A., and Cornman, J. F.
Comparison of 4-chloro, 3,4,-D, MCP, 2,4-D and 2,4,5-T in various formulations for the control of white clover in turf.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 371-4, bibl. 8.

In trials at Cornell, 2,4,5-T at ¾ and 1½ lb. per acre resulted in much better clover control than the other compounds. At the ¾ lb. rate the butyl ester formulation of 2,4,5-T was more effective than the triethylamine or pentyl ester formulations, but at the 1½ lb. rate there was little difference. The turf was not seriously injured by any of the treatments.

484. Hart, S. W., and DeFrance, J. A.
The pre-emergence control of smooth crabgrass with chemicals in lawn turf.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 345-51, bibl. 2.

The effectiveness of 10 herbicides against *Digitaria ischaemum* was tested at the Rhode Island Agricultural Experiment Station during the 1954 season. PMAS at 5 and 7 pints per acre and Alanap-1 at 8 lb. per acre, applied 3 times at monthly intervals or 6 times at 14-day intervals, appeared to be the most satisfactory. Clover control was provided by 2,4-D and Alanap-1 in 3 treatments and PMAS and 4 other materials in 6 treatments. Turf discoloration was noticed with some of the chemicals, but no permanent injury to the basic grasses resulted. [For earlier work see *H.A.*, 25: 1592.]

485. Gallagher, J. E., and Emerson, B. H.
Crabgrass control observations for 1954.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 385-9.

Seven herbicides, alone and in combination were tested for control of mature *Digitaria sanguinalis*. Di-sodium methyl arsenate at 6·8 lb. per acre gave good control with 2 applications and complete control with 3, without affecting the turf grass. KOCN was also satisfactory but caused slight turf discoloration. Dalapon both alone and in combination proved to be a non-selective grass killer.

486. Engel, R. E., and Aldrich, R. J.
Preliminary results of chemical control of goosegrass (*Eleusine indica*) in greens-type turf.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 357-8.

Sesin at 3 and 6 lb. per acre reduced goosegrass sufficiently to permit hand weeding and maintenance of a usable playing surface.—N.J. agric. Exp. Stat.

487. Jagschitz, J. A., and Cornman, J. F.
Studies in the control of *Veronica filiformis* in turf using KOCN, endothal, 2,4-D and 2,4,5-T.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 365-9.

In mixed turf at Cornell endothal gave almost complete control of *V. filiformis* for at least 1 year, with only moderate, temporary turf discoloration. Potassium cyanate, 2,4-D and 2,4,5-T were much less effective. It is tentatively recommended to apply endothal either in spring or autumn at ¾ lb. of actual material per acre in 200 gal. and to repeat the treatment 2 weeks later.

Weed control in vegetables.

(*See also* 456, 457, 731.)

488. Warren, G. F., and others.
[Weed control in] vegetables.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 103-16.

Beans (3 abstracts): In pre-emergence experiments with snap and lima beans CIPC, DNBP and CMU caused no injury while NP injured the beans. *Cabbage and broccoli* (2 abstracts): Natrin applied 1 week after transplanting seriously injured these crops, but when applied 3 weeks after transplanting it appeared promising. DU [dichloral urea] and a directed spray of TCA gave good grass control and no crop injury when applied 1 week after transplanting. *Cucurbits* (2 abstracts): Pre-emergence applications of NP gave good results in muskmelons, cucumbers and watermelons. DNBP and DU showed promise on these crops in one experiment but severely reduced stands of muskmelons in another. *Onions* (8 abstracts): In pre-emergence trials CIPC gave good weed control without affecting the stand or yield of onions in 3 out of 4 cases. Other materials found suitable were ethyl xanthogen disulphide, 2,4-D and Hydrin. In post-emergence treatments CIPC, ethyl xanthogen and CMU gave fair to good weed control without injury to the onions. On larger onion plants directed sprays were safer than overall sprays. *Tomatoes and peppers* (2 abstracts): Applications of 4 lb./a of Natrin applied 1 week after transplanting resulted in almost complete kill of tomato and pepper plants in one experiment but gave good weed control and little damage to tomatoes in another trial conducted under more favourable conditions. *Other crops* (9 abstracts): The abstracts relate to weed control in beets, carrots, okra, peas, peppermint and tobacco plant beds and deal with wild oats control in various crops.

489. Danielson, L. L.
Comparison of granular and spray applications of herbicides on vegetable crops.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 89-95, bibl. 3.

A combination of CIPC at 1 lb. per acre and Sesin at 2 lb. per acre applied in granular form immediately after planting strawberries in the autumn was very effective in killing chickweed and henbit. Granular applications of CIPC at 2 lb. and dalapon at 4 lb. were tolerated at layby time by tomatoes and peppers, though spray applications of dalapon at this rate were toxic to these crops. Different granular carriers within about the same particle size range were equally effective. [See also *H.A.*, 25: 1596].—Va Truck Exp. Stat.

490. Tafuro, A. J., Beatty, R. H., and Guest, R. T.
Progress report of crop tolerance period following various rates of amizol (3-amino-1,2,4-triazole) on Ewingsville soil.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 31-9, bibl. 5.

Results of 2 trials involving 13 crop plants are given. Amizol applied at 4 lb. per acre 3 days before planting was non-toxic only to lima beans. Applied 7 days before planting it did not affect tomatoes, squash, beets or lettuce. With a 14-day interval only cabbage, cauliflower and peas were affected, while with a 28-day interval no injury was observed on any crop. At the 8 lb. per acre rate the results were similar except that lima beans were temporarily affected when planted 3 days after application. A 14 day interval was necessary with tomatoes to prevent injury with 12-20 lb. per acre applications, and even 7 weeks were insufficient at a 40 lb. per acre level.

491. Hannah, L. H.
Field studies with a new class of herbicidal chemicals.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 15-19.

A description is given of large-scale trials with α-chloro-N,N-diallylacetamide and α-chloro-N,N-diethylacetamide. The materials applied at 3-6 lb. per acre gave very good control of grasses, i.e. various foxtails (*Setaria* spp.), and also reduced the stand of some broadleaved weeds. When used as pre-emergence herbicides, they gave very satisfactory weed control in horticultural crops such as sweet corn, onion, carrot, broccoli, spinach, beans, turnips, radish and table beets. For overall weed control in these crops the chloro-N, N-diethylacetamide appeared to be slightly better than the chloro-N,N-diallylacetamide. The compounds performed well on organic soils and their effectiveness did not seem to be affected by variation in soil moisture prior to or following application.—Monsanto chem. Co. [See also *H.A.*, 25: 3872.]

492. van der Zweep, W.
Pre-emergence weed control in vegetable crops.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

A summary of Dutch work on pre-emergence control especially by the application of sulphuric acid, dinitros and commercial oil preparations containing pentachlorophenol as fortifying agent.—Centr. Inst. agric. Res., Wageningen.

493. Berezovskiĭ, M. Ja.
Chemical method of weed control in vegetables. [Russian.]
Sad i Ogorod, 1955, No. 7, pp. 37-8.

Dried out peat bogs suitable for vegetable growing are often infested with weeds, particularly chickweed, for the control of which soil applications of isopropyl phenyl carbamate were found very effective. The herbicide at weed killing rates is non-toxic to vegetable crops with the exception of solanaceous plants and cucurbits. In an experiment in carrots pre-emergence applications of dry and liquid forms of IPC at 10-12 kg. per ha greatly reduced or completely prevented the germination of chickweed, stinging nettle and other weed seeds present. Carrot yields from the treated plots were 26·7% higher than from the untreated ones. IPC applied in table beets produced similar results and its general use in vegetables grown on low peat and bottom lands is recommended. [See also *H.A.*, 25: 460.]

494. Anon.
Chemical weed control in vegetable crops.
Seed World, 1955, **77**(5): 8, 40-1.

The importance of weed control is stressed by pointing out that the loss of crop from weeds is greater than the loss from diseases and insects combined. A table prepared by Michigan workers is given, suggesting weed control practices in asparagus, bean, beet, cabbage, broccoli, cauliflower, carrot, celery, onion, peas, spinach and cucurbits, and recommending chemicals for elimination of all herbaceous vegetation.

495. Langston, R.
Activities and residues of sulfur-35-labeled bis(ethyl xanthic) disulfide.
J. agric. Food Chem., 1955, **3**: 849-51, bibl. 4, illus.

Bis(ethyl xanthic) disulphide (Herbisan), containing S^{35}, was studied as a pre- and post-emergence herbicide for vegetables growing in a muck soil. Herbicidal concentrations applied as pre-emergence sprays were not absorbed in detectable quantities in any of the vegetables studied. Translocation after foliar applications was only detected in cabbage and cauliflower.—Agric. Exp. Stat., Purdue Univ., Lafayette, Ind.

496. Ellison, J. H., Aldrich, R. J., and Maclinn, W. A.
Effect of Karmex-W on the flavor of canned and frozen asparagus.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 137-9, bibl. 6.

After weed control treatment with 2 lb. per acre CMU, flavour difference in frozen asparagus was detected only in samples harvested on 2 out of 8 dates, while no differences at any dates were observed in the canned crop.—N. J. agric. Exp. Stat.

497. Davidson, J. H., and Ries, S. K.
Preliminary report on the control of quackgrass and annual weeds in Michigan asparagus plantings.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 131-6, bibl. 4.

Good control of quackgrass, *Agropyron repens*, was obtained with dalapon at 7-15 lb. per acre. With CMU plus Silvex [2,4,5-TP] at 15 lb. per acre all-season control of both annuals and quackgrass was obtained, though there was some risk of crop injury when the mixture was used as post-emergence spray.

498. Moore, J. F., and Wolfe, H. H.
Chemical weed control in pickling cucumbers for Western Washington.
Ext. misc. Publ. Wash. St. Coll., **34**, 1955, pp. 3.

It is recommended that 5 lb. of Alanap 1 or 10 lb. of NIX, each in 30-50 gal. per acre and providing complete coverage, should be applied immediately after seeding. A band application about a foot wide over the row, using less material, would reduce the cost of treatment.

499. Ries, S. K., and Howell, J. T.
The susceptibility of *Cucurbita* varieties to N-1 naphthyl phthalamic acid
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 201-8, bib. 6.

The reaction of 10 varieties belonging to 3 *Cucurbita* spp. (*pepo*, *moschata* and *maxima*) to pre-emergence applications of NP (Alanap) was tested under both laboratory and field conditions. None of the species showed uniform resistance. In the laboratory the range of tolerance for most varieties was between 5 and 10 p.p.m. In the field Zucchini, a *C. pepo*, was the most tolerant variety.—Mich. agric. Exp. Stat.

500. Lachman, W. H.
Pre-emergence weeding of squash.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 193-4.

Alanap-1 appeared more satisfactory than either Alanap-5 or Alanap-50W for weed control in squash, and the Blue Hubbard variety was more tolerant of these chemicals than the Butternut variety. Premerge at 3 lb. per acre gave better weed control and caused less crop damage than any of the phthalamic acid compounds.—Mass. agric. Exp. Stat.

501. Sweet, R. D., Crabtree, G., and Benedict, C.
Response of squashes to Alanap-1.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 195-9, bibl. 4.

The relative tolerance to pre- and post-emergence spraying with Alanap-1 of a number of squash varieties is given. Applications made before both crop and weed emergence gave less crop damage and better weed control than post-emergence sprays.—Cornell Univ.

502. Moore, J. F., and Wolfe, H. H.
Chemical weed control in beans for Western Washington.
Ext. misc. Publ. Wash. St. Coll, **34**, 1955, pp. 3.

One gallon of commercial dinitro amine (Premerge or Sinox P.E.) in 30 to 50 gal. water per acre is recommended, assuming complete area coverage. For best results the spray should be applied either at the time of, or just prior to emergence of the beans.

503. Noll, C. J., and Odland, M. L.
Weed control in lima beans with various herbicides.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 183-6.

All 10 herbicides used gave very good weed control and 8 of them significantly increased yields. Premerge at 1-3 gal. and sodium pentachlorophenate at 6 gal. per acre were the most outstanding. [For earlier results of work in this series see *H.A.*, 25: 1606.]

504. Loeffler, G.
Environment and rate of application studies on bean pre-emergence weed control with CIPC.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 177-81, bibl. 4.

CIPC at rates from 4 to 20 lb. per acre was applied pre-emergence to Red Kidney beans in the morning, at noon and in the evening. Yields were generally lower from the noon, i.e. highest temperature treatment, but the effect of the time of application was more marked with the intermediate than with the lower and higher rates. The lower rates were low in toxicity and little difference was found to result from temperature variations, while at the higher rates phytotoxicity was so severe that the effect of temperature was not strongly expressed. It is suggested that vapours of volatile carbamates such as CIPC penetrate the seedlings prior to emergence and that temperature at the time of application is an important factor in determining injury.—Cornell Univ.

505. Danielson, L. L., and Schumacher, M. H.
Experimental use of dalapon and natrin on certain transplanted vegetable crops.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 97-103, bibl. 4.

In experiments to ascertain the tolerance of certain vegetable crops to herbicides it was found that snap beans were tolerant of dalapon applied pre-emergence at 4-6 lb. per acre, a rate sufficient for annual grass control. Both dalapon and natrin at effective rates were highly toxic to young tomato transplants. Tomato and pepper plants at the lay-by stage were tolerant of natrin at 2-4 lb. per acre, but not of dalapon.

506. Slife, F. W., and others.
[Weed control in] soybeans and peas.
Res Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 72-80.

Of the 13 abstracts submitted 8 deal with weed control in peas. In general, the pre-emergence chemicals applied at rates necessary to control weeds injured the peas. For post-emergence treatment MCPA and dinitro were again the best, but more crop injury was reported with MCPA this year than in previous years. One trial on the effect of spray volume on the tolerance of peas to 2,4-D and MCPA showed that with each increase in volume of water, injury decreased when the rate of either chemical was held constant.

507. Dallyn, S. L., and others.
Weed control in sweet Spanish onions
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 161-8.

Various rates of CMU, CIPC and KOCN were used as pre- and post-emergence sprays. The most satisfactory pre-emergence treatments were ⅓ lb./a CMU or 3 lb./a CIPC. The most promising post-emergence treatments, applied 6-8 weeks before harvest, were directed sprays of either CMU at ⅓-½ lb./a or CIPC at 3-6 lb./a.—Long Island Veg. Res. Farm.

508. Noll, C. J., and Odland, M. L.
Weed control in set onions with pre-emergence and post-emergence application of herbicides.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 157-9, bibl. 6.

Considering weed control, crop yield and cost of application, post-emergence treatment with CIPC at 4 lb./a. or KOCN at 16 lb./a. in 100 gal. were the most satisfactory. Pre-emergence treatment with CIPC followed by post-emergence treatment with KOCN was better than KOCN alone.—Pa agric. Exp. Stat.

509. Papai, M. J., Baran, W., and Marshall, E. R.
Experimental trials and grower usage of herbicides on muck-grown onions in New York State in 1954.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 151-5, bibl. 5.

In small plot trials of 14 herbicides on muck-grown onions from seed, CMU, PDU and DMU were found to be the most satisfactory when applied pre-emergence. In commercial trials with both seed and set onions CIPC proved to be safe and effective.

510. FERGUSON, W., AND JASMIN, J. J.
Chemical weed control in onion, squash and tomatoes.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 169-75, bibl. 14.

Onion: One or two applications of CIPC at 4 lb. per acre appeared to be non-toxic. At 8 lb. per acre weed control was better, but growth was delayed and vigour impaired. *Squash and pumpkin*: Alanap-1 at 2 lb. per acre was insufficient for weed control. Applications of 4 and 6 lb. per acre improved weed control but injured most of the varieties tested. *Tomato*: Sesin at 8 lb. per acre gave better weed control and caused less crop injury than natrin at 5 lb. Yields from the natrin-treated determinate or bush varieties were reduced but yields from indeterminate varieties were not affected.—Centr. exp. Farm, Ottawa.

511. SWEET, R. D.
Herbicides for tomatoes.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 141-9, bibl. 7.

Applications of 21 herbicides were made to tomatoes immediately after transplanting and at lay-by. Natrin was outstandingly good with regard to both plant response and weed control. Further work to find possible causes of crop injury by this material suggested that the physiological condition of the plants, rather than age, influenced response. Plants capable of rapid root development were more tolerant than those severely hardened or shaded prior to treatment.—Cornell. Univ.

512. SWEET, H. A., AND MARSHALL, E. R.
Post-setting and lay-by applications of herbicides to canning tomatoes in western New York.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 115-19, bibl. 2.

None of the 11 herbicides tested was satisfactory when applied immediately after transplanting owing either to ineffectiveness or to toxicity. Replants set in plots treated 10 days previously with Methin (sodium salt of 2-methyl, 4-chlorophenoxyethyl sulphate), 6831 (2-(2,4,5-trichlorophenoxyethyl benzoate)) or natrin did not show visible signs of injury. Natrin, 7977 (diethanolamine salt of 2,4,5-trichlorophenoxyethyl sulphate) and Methin appeared satisfactory for application at lay-by time.

513. MENGES, R. M., AND ALDRICH, R. J.
The responses of tomatoes to natrin and derivatives as affected by time of application and irrigation.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 121-6, bibl. 5.

Natrin and 2 related compounds, E.H.6831 and E.H.7977, were tested at 2½ lb. and 5 lb. per acre levels. Natrin and E.H.7977 were effective against broadleaf and grassy weeds at both levels; E.H.6831 was somewhat less so. Irrigation did not affect weed control. Hormone effects were particularly noticeable in the case of E.H.6831 on early sprayed plants. The yields obtained after late application were higher than those after early application. While the latter treatment tended to cause more discard fruit, only the 5 lb. rate of natrin materially increased it. No other effect on quality was observed.

514. ZEDLER, R. J.
Progress report on the use of Experimental Herbicide Natrin 80S in tomatoes.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 127-30.

Results obtained in the N.E. United States and Canada indicate that natrin 80S is a promising herbicide for tomatoes provided dosage does not exceed 4 lb. per acre, especially immediately after transplanting. Weed control would appear to be better under conditions of adequate moisture. [See also *H.A.*, 25: 3870.]

Herbicides and apparatus.

(*See also* 523a, c, h, o.)

515. BIVINS, J. L., AND KOFRANEK, A. M.
New soil fumigant.
Calif. Agric., 1955, **9**(9):6, illus.

Soil fumigations by vapam were applied in mid-August, 10 days before sowing *Matthiola incana*. Excellent weed control was obtained at all rates (½, 1 and 1½ lb. per 100 sq. ft.), with the higher rates controlling more species. At the 1½ lb. rate bermuda grass was completely killed. Plant stand and size was improved by the treatment. The average date of harvesting from all plots was about the same; plots treated with the 1 lb. dose produced the most No. 1 stocks. *Sclerotinia sclerotiorum* attack was reduced in all treated plots.—Univ. Calif., Los Angeles.

516. HÄHNE, H.
Beitrag zur Frage der herbiziden Wirkung von Chlorpikrin (Larvacide). **(On the herbicidal action of chloropicrin (Larvacide).)**
Z. PflKrankh., 1955, **62**: 612-17.

Larvacide was shown to kill seeds in compost provided certain rules were observed, such as covering the heap after treatment and turning over its surface layer from time to time.

517. SANTELMANN, P. W., AND WILLARD, C. J.
The absorption and translocation of dalapon.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 21-9, bibl. 6.

Quack grass shoots were treated with 2,2-dichloropropionic acid by spraying or by immersion. The material entered the leaf rapidly and was found to be easily translocated through the rhizomes into untreated shoots. When plants were kept in the dark before treatment, it was found that dalapon was probably translocated with photosynthates, but that this was not the only means of translocation.—Ohio State Univ.

518. THIEGS, B. J.
The stability of dalapon in soils.
Down to Earth, 1955, **11**(2): 2-4, bibl. 6.

Three soils, a clay loam, a silt loam and a sandy loam, were used in a study of the effect of temperature, moisture and organic matter on residual quantities of dalapon in the soil. At 40° F. there was little decomposition of dalapon in any of the soils during the test period of 8 weeks. At 60° F. considerable decomposition occurred during the last 4 weeks of the test period. At 80° F. dalapon had disappeared from all soils in 3-4 weeks. In soils stored at 100° F. dalapon had almost completely disappeared from moist soils after 4-5 weeks; large amounts were still present in dry soils after 14 weeks. Fresh applications of dalapon to the moist soils disappeared after 1 week. Further applications to these soils after sterilization were completely unchanged after 1 week. After 2 weeks dalapon applications had completely disappeared from the clay loam to which peat or manure had been added.—Dow Chem. Co.

519. McCall, G. L.
Comparative use efficiency of the substituted urea herbicides for industrial weed control.
Abstr. in *Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955*, New York, p. 451.

CMU (Telvar W) and 3,4-DDU (Telvar DW) were compared. For regions with low rainfall (20 in. or less) Telvar W is recommended, and for regions with high rainfall Telvar DW. [See also *H.A.*, 25: 3882.]

520. Creasey, L. E., and Wilson, C. E., Jr.
Equipment factors affecting the application of wettable powder formulations of substituted urea herbicides.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 41-51, illus.

An examination was made of methods of agitation suitable for wettable powder suspensions. Jet agitation was found feasible with CMU, and the operating conditions are given, including layout of booms and tanks. Methods of mixing and preventing foaming are described.

521. Hebblethwaite, P.
A tentative method for investigating the influence of application rate on the penetrative power of herbicide sprays.
J. Sci. Food Agric., 1955, **6**: 582-4, bibl. 4.

A method suitable for investigating the penetration of herbicide spray into ground-crop foliage is presented. Under the conditions of the trials, a high volume application resulted in a greater retention of spray at the level of the weeds than did a low-volume application. [From author's summary.]—Nat. Inst. agric. Engng, Silsoe.

522. Larson, R. E., and others.
Mechanical considerations.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 150-7.

Five abstracts deal with equipment for mechanical and chemical brush control and 9 with equipment for weed control in field crops.

Noted.

523.

a Aldrich, R. J.
Promising new chemicals.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, p. 7.
Notes on 9 herbicides.

b Bivins, J. L., Johnson, B. L., and Harvey, W. A.
Morning glory control.
Seed World, 1955, 77(6): 20.
See *H.A.*, 25: 3850.

c Dutton, W. C.
New herbicides.
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 140-9.
A summary of 80 abstracts on 13 so-called new herbicides is presented without interpretation.

d Esteves-de-Sousa, A.
Erradicação de *Cyperus rotundus* L. pelo ácido 2,4-diclorofenoxiacético (2,4-D). **(Eradication of *Cyperus rotundus* with 2,4-D.)** [English summary ½ p.]
Portugal. Acta biol., 1954, **4**: 5-25, bibl. 25, illus.
At 4% concentration.

e King, L. J., and Kramer, J. A., Jr.
A review of the crabgrass (*Digitaria ischaemum* and *D. sanguinalis*) with notes on their pre-emergence control in turf.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 359-63, bibl. 7.
Using SES.

f Loev, B.
The active constituents of poison ivy and related plants: structure and synthesis.
Diss. Abstr., 1955, **15**: 327-8, being *Publ.* 10,811 of 120 pp.
In Anacardaceous plants causing dermatitis.

g Mackenthun, K. M.
The control of submerged aquatic vegetation through the use of sodium arsenite.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 545-57, bibl. 12, illus.
In Wisconsin.

h Markwardt, E. D., and Gunkel, W. W.
Equipment available for applying solubles, emulsions and wettable powders.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 59-64.

i Marshall, E. R.
Review of recent advances in chemicals and practices in weed control among various crops.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 75-83.

j Ministry of Agriculture, London.
Ragwort.
Adv. Leafl. Minist. Agric. London., **280**, amended 1955, pp. 4, illus.
Description, control and legislation.

k Niering, W. A.
Herbicide research at the Connecticut Arboretum.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 459-62, bibl. 2.
On woody plants.

l NOORDAM, D.
Onkruiden en de verspreiding van virusziekten. (**Weeds and the spread of virus diseases.**) [English summary 11 lines.]
Meded. Dir. Truinb., 1955, **18**: 639-45, bibl. 8.
The role of weeds as hosts of vector-transmissible and soil-borne viruses.

m PHILLIPS, W. M., AND TIMMONS, F. L.
Bindweed—how to control it. Results of bindweed control experiments at the Fort Hays Branch Station, Hays, Kansas, 1935-1952.
Bull. Kans. agric. Exp. Stat. **366**, 1954, pp. 40, bibl. 25, illus.
Experimental results with recommendations to suit farm conditions.

n RAYBOULD, F. W.
Plot spraying equipment. [French and German summaries 13 and 16 lines.]
Tech. Mem. N.I.A.E. **122**, 1955, pp. 7, illus.
Land-rover-mounted equipment for experiments with selective herbicides.

o THORPE, I. G.
The use of pentachlorophenol in a miscible oil formulation for pre-emergence weed control.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*
Monsanto Chemls Ltd., Fulmer, Bucks.

p VOGEL, F.
Der Tabakwürger und seine Bekämpfung. **(Broomrape of tobacco and its control)**
Dtsch. Tabakbau, 1954, pp. 145-6, from abstr. in *Z. PflKrankh.*, 1955, **62**: 456.
Orobanche ramosa by calcium cyanamide when soil is moist.

q WILLARD, C. J., AND OTHERS.
Canada thistle (*Cirsium arvense*).
Res. Rep. 11th annu. N. centr. Weed Control Conf. 1954, Fargo, N. Dak., pp. 12-13.
Amino triazole is the most promising herbicide.

r VAN DER ZWEEP, W.
Chemische onkruidbestrijding. (**Chemical weed control.**) [English summary 5 lines.]
Meded. Dir. Tuinb., 1955, **18**: 658-71, bibl. 6, illus.
In Holland.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE

General.

(*See also* 77, 87, 99-113, 117c, j, y, 118k, 263, 488-514, 732c, k, n, p, t-v, x, 733c, g, l, 1068j, 1253, 1255, 1256, 1259, 1269, 1276, 1285f.)

524. BUNDESANSTALT FÜR ALPINE LANDWIRTSCHAFT ADMONT. (KARNER, L.).
Vorläufige Mitteilung von Teilversuchsergebnissen der Bundesanstalt für alpine Landwirtschaft Admont (Austria). Berichtsjahr 1953/54. (**Preliminary communication of experimental results of the Federal Institute of Alpine Agriculture, Admont, Austria, for 1953/54**), 1954, pp. 117, being Heft 26.

During the period covered by the report the station was in process of transfer from Admont to Gumpenstein. On pp. 98-117 tabulated data are presented on vegetable variety trials newly established at Gumpenstein.

525. DE KEIJZER, R.
Jaarverslag 1954 van de Bedrijfsvoorlichtingsdienst voor de Tuinbouw in de Provincie Oost-Vlaanderen. (**Annual Report 1954 of the Advisory Service for Commercial Horticulture for East Flanders** [Belgium]), [1955], cyclostyled, pp. 150.

The trials, though primarily for local application, are mostly of wider interest. In trials with scorzonera, variety Duplex, performance was variable, indicating that selection is necessary. The onion variety Ebenezer gave the highest yields in an onion sett trial. Seed disinfection with TMTD, Phygon and Spergon was effective with early onion, pea and bean varieties. Herbicidal sprays of IPC + NIX controlled weeds in strawberries but reduced growth and yields. Rhenania and Money-maker were the most suitable tomato varieties for outdoor culture. Strawberry mildew (*Sphaerotheca humili*) was most successfully controlled on leaf and fruit by Pyramyl 3% (TMTD). Other trials reported concerned soil sterilization for onions, supplementary light for tomatoes, foot rot in melons, and varieties of strawberries, beans and onions.

526. NORTH, C.
Vegetable culture.
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, 1955, pp. 19-21.

Reports of work in progress include: variety trials with French beans, spinach, peas and brussels sprouts; inter-varietal crosses of cabbage and brussels sprouts. Studies on growth and development of cabbage suggest that the head results from the failure of a proportion of the normal complement of leaves to unfold: the absence of inhibition of leaf unfolding in rogue plants may be related to an early changeover from the vegetative to the reproductive phase.

527. DIVISION OF HORTICULTURE, DEPARTMENT OF AGRICULTURE, UNION OF SOUTH AFRICA.
Vegetable production in South Africa.
Bull. Dep. Agric. S. Afr. **330**, 1955, pp. 210, illus., 3s. 6d.

The subjects covered are the ecological and fertilizer requirements of vegetables, including melons, weed control, seedbed practices, seed quality and the culture of the common and less common vegetables and of culinary herbs.

528. KHAN, A. R., AND GHAYUR, A.
Vegetable growing in the Punjab (Pakistan).
GHAYUR, A.
Manuring vegetable crops in the Punjab.
Agric. Pakistan, 1954, **5**: 11-20, and 24-6, bibl. 7.

In the first paper it is noted that systematic research on breeding and selection is in progress under the control of the vegetable botanist, Punjab Agricultural College and Research Institute Lyallpur, at Murree in the higher hills, at Samli and Dahla in the lower hills and at Sialkot in the sub-mountain tract. In the second advisory notes are given on the culture and manuring of the commoner vegetables under different environmental conditions.

529. MILLER, J. C.
Some techniques used in the breeding of vegetable crops in the United States.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Among handling methods necessary to bring plants into flower—most essential to the breeder—are photoperiod adjustment, training into upright position, girdling, grafting, the application of chemical and hormone sprays, altering the nutritional balance, controlling rest period and temperature, and pollen storage. Some examples are given of the use of one or other of these in the breeding of potatoes, sweet potatoes, cabbage and tomatoes.—La St. Univ., Baton Rouge.

530. DREWES, H.
Breeding vegetable varieties for pre-packaging.
Market Grs' J., 1955, **84**(8): 23, illus.

Varieties of radish, hybrid sweet corn, tomato, carrot, celery, onion and spinach suitable for prepackaging.

531. KRICKL, M.
Zur Frage der Züchtung von frostsicheren Bohnen, Gurken und Tomaten. (**On the problem of producing frost resistant beans, cucumbers and tomatoes.**) [Summaries in English, French, and Spanish, 3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 177-84, bibl. 3.

Selection for resistance to autumn frosts appears promising. Some of the work was carried out at high altitudes.

532. PHILIPP, F.
Ergebnisse der Sommergemüsesortenversuche 1954. (**Results of trials with summer vegetable varieties 1954.**) [Summaries in English, French and Spanish, $\frac{3}{4}$ p. each.]
Mitt. Klosterneuberg, Ser. B, 1955, **5**: 184-204.

Varieties of the following vegetables were tested for the official Austrian register [see *H.A.*, 21: 511 and 513]: lettuce, cucumber, gherkin and tomato.

533. WALKOF, C., AND NUTTALL, V. W.
Hybrid vegetables for short-season gardens.
Publ. Canada Dep. Agric. **947**, 1955, pp. 7.

The advantages of F_1 hybrid vegetables for the Prairie Provinces are outlined. Summarized results of trials at Morden, Man., indicate that hybrids of tomatoes, cucumbers, onions and muskmelons may produce higher and earlier yields than pure varieties and have a better chance of survival under adverse conditions. Some named hybrids are recommended.

534. GOÏKO, V. A.
Means of controlling seedlessness in vegetable seed plants. [Russian.]
Sad i Ogorod, 1955, No. 7, pp. 18-21, illus.

In the south of the Ukraine hot, dry weather with low relative humidity and drying winds has an unfavourable effect on the pollination of vegetables, resulting in much seedless fruit. To prevent this, seed plants of cucumber, onion, radish and beetroot were grown on small plots between rows of sunflower or other tall plants providing shelter, were irrigated and, during flowering, artificially pollinated. All these measures improved both the yield and quality of seed, the best results being obtained by the combination of all three.

535. NEW SOUTH WALES, DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Vegetable seed treatment.
Agric. Gaz. N.S.W., 1955, **66**: 247-8, 253, illus.

Recommendations for pre-sowing treatment of seed of beet, brassicas, carrot, lettuce, spinach, celery, cucurbits, onions, legumes and tomatoes.

536. SHANMUGAN, T. S.
A preliminary study on the distinctiveness of dormancy and viability in vegetable seeds.
Madras agric. J., 1954, **41**: 230-2, bibl. 2.

Seeds of tomato, amaranthus, bitter gourd, snake gourd and okra were subjected to 10 consecutive daily germination tests beginning in early November 3 days after extraction from the ripe fruit, and subsequently to fortnightly tests up to mid-April. Except for bitter gourd the seeds showed no dormancy during the first week. Germination percentage rose during the second fortnight, declined slightly in the next 2 and rose again from the 6th onwards.—Agric. Res. Inst., Coimbatore.

537. NAKAMURA, S., OKASAKO, Y., AND YAMADA, E.
Effect of light on the germination of vegetable seeds. [Japanese, with English summary $\frac{3}{4}$ p.]
J. hort. Ass. Japan, 1955, **24**: 17-28, bibl. 23.

Light strongly inhibited radish seed germination for some time after harvesting; the effect persisted for some years, but gradually disappeared with age. Brassica seed was positively photosensitive, but was forced by light only during dormancy. Germination of dormant seed of shingiku (*Chrysanthemum coronarium*) was promoted by thiourea; no light effect was observed. Seed germination of mitsuba (*Chryptotaenia japonica*) was favoured by light at any temperature; by alternating temperatures the seeds could be germinated almost completely in darkness. The response of mitsuba and of celery to light was not related to seed age. The rate of onion seed germination was retarded to some extent by light; in Welsh onion [*Allium fistulosum*] the effect was stronger. Temperatures above 28° C. suppressed onion seed germination. Eggplant and tomato seed germination was suppressed by light at all temperatures. The rate of germination of both plants was reduced at 20° C., The photosensitivity of eggplant was not affected by seedcoat removal. Germination of pepper was retarded in ordinary electric light at all temperatures, but not in fluorescent light. Germination of watermelon, squash, calabash gourd, wax gourd and balsam pear [*Momordia* *charantia*] was inhibited by light at all but particularly at low temperatures. Cucumber melon and shirouri (*Cucumis melo* var. *conomon*) seeds were only inhibited by light at low temperatures. Photosensitivity of these cucurbits was not related to seed age, and the light response could not be replaced by dormancy-breaking treatments or by decoating the seeds. Perilla and ramie seed germination was promoted by light at all temperatures, irrespective of age. No light effect was observed on carrot, spinach, beet or leguminous seeds. In cucurbitaceae germination was inhibited in the infra-red and blue regions, but not in the green. Eggplant, tomato and pepper seeds were strongly inhibited only in the short infra-red region, which also inhibited brassica seed to some extent. Onion and Welsh onion seed did not show any reaction to the spectrum. Germination of edible burdock [*Arctium lappa*] seed was promoted and that of watermelon was inhibited to some extent by weak continuous light. The effect was more complete at light intensities of 200-300 lux and above.

538. WEIBULL, G.
The cold storage of vegetable seeds.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Generally speaking −20° C. proves a better temperature at which to store vegetable seed than ±0° C. This applies to onion, carrot, celery, parsnip and beet, but not to parsley which loses its germinative power rapidly at −20° C.—W. Weibull A. B., Landskrona, Sweden. [See also *H.A.*, 23: 679.]

539. WARE, L. M., AND JOHNSON, W. A.
Use of field bins for experimental studies with vegetable crops.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 423-6.

Experience at the Alabama Agricultural Experiment Station is reported on the use of field bins for studies on vegetable crops. They are especially valuable where only a limited amount of uniform land is available. Experience has shown that the results are dependable. The bins yield numerous data on a limited area at a relatively low cost, are suited to many variations in experimental design, and are adapted to many types of study.

540. UEHARA, M., AND ISOZAKI, Y.
On the microclimate under cloches. [Japanese with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 166-72.

A study was made of the diurnal variations in solar radiation, air and soil temperature, humidity, vapour tension and evaporation in and outside vinyl-film or oil paper cloches as affecting vegetables. Observations are graphed and tabulated with English legends.

541. BEREZOVA, E. F., AND OTHERS.
The preparation and use of biologically active composts for vegetable crops. [Russian.]
Zemledelie, 1955, 3(5): 73-7.

As in earlier experiments [see H.A., **25**: 3476], tomato and cabbage plants raised in nutrient blocks made of composted materials grew better and produced earlier and higher yields than those raised in blocks of uncomposted mixtures of the same materials. The best results were obtained with a compost prepared from 50% peat, 30% dung, 10% sewage, 3% phosphate fertilizer and 7% soil.

542. JANES, B. E.
Vegetable rotation studies in Connecticut. III. Effect of sweet corn and vetch on the growth of several crops which follow.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 324-30, bibl. 5.

Lettuce and onions grown the year after sweet corn were badly stunted because of injury to their roots. Young beet plants were injured slightly but recovered to make normal growth. The yield of tomatoes was somewhat lower on plots previously planted to corn. Vetch as a cover crop eventually stimulated the growth of beets. Lettuce and onions were retarded slightly by the vetch. It is postulated that during the decomposition of the corn residues under cool temperatures of spring a toxin is formed which injures the roots of plants. This toxin disappears with the advent of warm weather. [Author's summary.]—Univ. Conn., Storrs.

543. EDELJŠTEĬN, V. I.
Die biologischen Grundlagen der Agrotechnik hoher Gemüseerträge. **(The biological basis of technical methods for achieving high vegetable yields.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Seedling quality is all important to yield. Raising and transplanting from frames means loss of roots and energy. The use of paper basins, peat and compost pots and peat and compost soil blocks is recommended, especially blocks made of half-rotted sphagnum or marsh peat mixed with shavings. Optimum light and temperature conditions are also essential. Finally mechanical planting out according to an orderly and manageable pattern is advised. Mention is made of the development at the Timirjazev Agricultural Academy of a system whereby protection is given to germinating vegetable seeds by paper strips, the seeds being sown by an attachment to the Bjelaruss tractor. [See also *H.A.*, 25: 2808.]

544. HARRIS, G. H.
The effect of climate, soil and fertilizer treatments on the chemical composition and food values of some fruits and vegetables in British Columbia.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Crops, Potatoes, carrots, turnips, and beets. *Basic fertilizer treatments:* low N and high K, high N and low K, normal fertilizer 5-10-5, no fertilizer, normal + B. Results are summarized according to soils which are designated as: peat muck, sandy loam, light clay loam, heavy clay loam, peaty clay, and according to fertilizer treatment. *Other experiments* with other crops concerned the use of B, Cu, Mn and Zn.—Univ. B.C., Vancouver.

545. EDWARDS, C. H., CARTER, L. P., AND OUTLAND, C. E.
Cystine, tyrosine, and essential amino acid contents of selected foods.
J. agric. Food. Chem., 1955, **3**: 952-7, bibl. 24.

The vegetables studied, namely cabbage, collard greens, field peas, mustard greens, okra, turnip greens and yams, were rated as fair to poor sources of essential amino acids on a fresh weight basis.—Tuskegee Inst., Ala.

546. King, J. R.
Effect of droplet size and the rate of application in controlling insects and diseases of row crops.
Diss. Abstr., 1955, **15**: 1156-7, being *Publ.* 12369 of 90 pp.

Combinations of 2 droplet sizes (110 and 175 microns mass median diameter) and 2 rates of application (10 and 20 gal. per acre) were sprayed on bean and onion foliage by a mist concentrate apparatus using copper oxychloride sulphate. All 4 combinations gave satisfactory distribution and deposit of the Cu spray; the 20 gallon rate and the larger droplet size gave the best coverage. In further experiments a low gallonage sprayer and a duster were also used to extend the range of application rate; the active ingredient in the sprays was applied at a constant rate per acre. Replicated experiments showed that all application methods gave satisfactory results. There was some indication that (*a*) the 20 gal. rate and larger droplet size applied with the mist concentrate sprayer gave the best control of onion blast (*Botrytis allii*); (*b*) the 25 gallon rate applied with the low-gallonage sprayer gave the best control of onion thrips (*Thrips tabaci*). All spray treatments were equally effective against larvae of the Mexican bean beetle (*Epilachna varivestis*).—Cornell Univ.

547. Boswell, V. R., and others.
Effects of certain insecticides in soil on crop plants.
Tech. Bull. U.S. Dep. Agric. **1121**, 1955, pp. 59, illus., 30c.

The results are given of recent studies in various parts of the United States on the effects of DDT, BHC, chlordane, aldrin, parathion and dieldrin on leaf, fruit and root vegetable crops.

548. Chisholm, D., MacPhee, A. W., and MacEachern, C. R.
Effects of repeated applications of pesticides to soil.
Canad. J. agric. Sci., 1955, **35**: 433-9, bibl. 14.

The effects of repeated applications of various insecticides to the soil were investigated in the years 1949-1953. Yield decreases were caused in beans by arsenic, in beans and onions by DDT, and in beans, onions and carrots by ferbam and by sulphur. DDT, arsenic and BHC accumulated in the soil, whereas parathion and sulphur did not. There was evidence of translocation of parathion and BHC in plants. Arsenic, sulphur, ferbam and BHC influenced the chemical composition of the soil. [From authors' abstract.]—Canada Dep. Agric., Kentville, N.S.

549. Peters, B. G.
The combined use of nematocidal soil fumigants and solubilized chemicals.
J. Helminth., 1955, **29**: 81-6, bibl. 6.

In pot experiments it was found that there was a considerable loss of DD vapour from the surface layer of soil, resulting in a residue of *Heterodera rostochiensis* survivors in the top 2 inches. This loss was only moderately reduced by using a water seal or a non-gas-tight seal of foil. Further experiments showed that these survivors could be killed by treating the soil surface with a micellar solution of *p-m* cresol, solubilized by the method of Staniland and Stone (*J. Helminth.*, 1953, **27**: 41-74). There was no interaction between the two treatments. It is concluded that the practical applications of this may be of some importance in treating glasshouse soils.—Rothamsted exp. Stat.

550. Ehrle, L.
Die Bekämpfung der Bodenkrankheiten. **(Control of soil diseases.)**
Gartenwelt, 1955, **55**: 274-5, illus.

Nematode-infested soil was treated with 32 c.c. chloropicrin per sq. m., with and without the addition of ethylene dibromide. Gall formations on roots of a subsequent cucumber crop were much reduced, particularly when ethylene dibromide was used. No growth improvement was observed in lettuce and kohlrabi in treated plots, but tomato plants showed much improved growth.

Asparagus.

551. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med forskellig jordreaktion til asparges og rabarber. **(Experiments on the effect of soil reaction on asparagus and rhubarb.)**
Tidsskr. Planteavl, 1955, **59**: 159-60.

Asparagus was grown at the following pH values: 5·7, 6·0, 6·4, 6·8 and 7·5. At the highest value the yield of large shoots (over 40 g.) was doubled, that of medium-sized shoots (25-40 g.) raised by 70% and that of small shoots (under 25 g.) doubled in comparison with the lowest value. Distribution of shoot weight within the three grades and earliness were not affected by pH value. [For the results obtained with rhubarb see *H.A.*, 25: 1659.]—Spangsbjerg.

Brassicas.

(*See also* 58, 415, 732f, 733i.)

552. Ministry of Agriculture, London
Cabbages, brussels sprouts and miscellaneous green crops.
Bull. Minist. Agric. Lond. **132**, 2nd edition, 1955, pp. 32, illus., 2s.

This edition closely follows the 1946 reprint of the first edition dated 1945. Among the principal changes are the expansion of the sections on red cabbage and mechanical planting and the bringing up to date of the sections on pests and diseases.

553. Finch, C. G.
Autumn cauliflower investigations, 1953.
J. nat. Inst. agric. Bot., 1955, **7**: 355-64, bibl. 1.

As a result of trials made at several centres in Britain with 58 named varieties of autumn cauliflower it was possible to classify the varieties into 9 groups based on period of maturity or 12 groups based on leaf characters.

554. BARTON, L. V., AND MCNAB, J.
Free amino acids in the seeds of *Brassica*.
From abstr. in *Plant. Physiol.*, 1955, **30** (Suppl.): xxvi.

Differences were detected in the amino acid content of kohlrabi, mustard and turnips. Cabbage and kohlrabi contained more arginine than the other forms studied.—Boyce Thompson Inst., New York.

555. PODEŠVA, J.
Studie o vlivu nekterých synthetických růstových stimulátorů na vývoj a sklizeň zelenin. (**The influence of some growth stimulators on the development and yield of vegetables.** [English and Russian summaries ½ p.]
Sborn. čsl. Akad. zeměd. Věd. Rostl. Výroba,* 1955, **28**: 81-92, bibl. 14, illus.

Soaking the seed of the mid-season cabbage, variety Pourovo Dobrovodské, for 24 hours in a weakly acid solution of 0·01-0·02% heteroauxin at 3-13° C. gave a yield of 23-25% more than the controls. Treatment with the same concentration at 20° C. retarded growth and reduced yield, while a lower, viz. 0·005%, concentration gave an initial stimulation which was not maintained. Higher concentrations of heteroauxin and α-naphthylacetic acid had a toxic effect on various vegetables, which was counteracted by the addition of ascorbic acid, aneurin and sulphocarbamide and also by mixing with talc. In field experiments these mixtures improved quantity and quality of yield. The favourable results reported were not obtained on all soils or in all seasons, and long-term experiments to elucidate the various influences are to be undertaken.

556. HAINE, K. E.
A technique for maintaining clones of Roscoff broccoli winter cauliflower.
J. nat. Inst. agric. Bot., 1955, **7**: 365-6, bibl. 3.

The most favourable time for rooting and growing cuttings from curds of Roscoff broccoli is when flower buds are just discernible. "Quick dip" in indolyl butyric acid gave rooting in 10 to 20 days when the cuttings were propagated at 70° F. Flowering is suppressed by growing on the cuttings for about 2 weeks at 70° to 80° F. Each curd can produce many leafy shoots from August onwards: removed in September or October these shoots give rise to small well-hardened plants, curding later than usual and needing less protection from frost; such plants are ideal for seed production. Such use of clones will make stability of Roscoff broccoli stocks possible. [From author's summary.]

557. SINGH, V.
Cauliflower seed production.
Indian J. hort., 1955, **12**: 19-21, bibl. 1.

The variety Mid-Saharanpur was used in trials of the effect of transplanting on seed production. Seed production was greater from plants left *in situ* than from those transplanted. There was no significant difference in seed quality from transplanted and undisturbed plants.—Hort. Res. Stat., Saharanpur.

558. CHROBOCZEK, E.
Influence of the age of plants at the beginning of cold treatment and of the length of cold treatment on seed-stalk development and yield of seed of two white cabbage varieties.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

In cabbage trials at Skierniewice and on the Baltic in Poland yield of seed varied according to variety, time of sowing and time of exposure of plants to low temperature. The highest yields were obtained in 8 different treatments when the plants received fertilizer applications of $NaNO_3$/0·1 mol. in solution.

559. DE ZEEUW, D., AND LEOPOLD, A. C.
Promotions of flowering with auxin.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xx.

In brussels sprouts the juvenile stage has been shortened by 2 weeks by the application to the plants of dilute auxin pastes [precise auxins not stated]. Application during the thermoinduction period was the most effective.—Dep. Hortic., Purdue Univ., Lafayette.

560. MOORE, E. L.
Chemical found to delay early seeding cabbage.
Miss. Fm Res., 1955, **18**(5): 1, 6, illus.

Prolonged cold weather may cause spring cabbage to bolt, especially if it occurs when the plants are large. In tests in Mississippi bolting in Golden Acre cabbage was reduced by applying CIPP (alpha ortho chlorophenoxy propionic acid) to medium-sized plants (i.e. with 4- leaves) in the middle of a 6-weeks cold treatment at 38° F. Spraying before or after the cold treatment stimulated bolting. None of the smaller plants bolted even when not sprayed, but spraying during cold treatment increased the firmness of the heads. All the larger plants bolted, but spraying during cold treatment reduced the degree of bolting and delayed the appearance of seed stalks by as much as 3 weeks. It is recommended that only small plants should be selected for planting, and that if cold weather is prolonged they should be sprayed with CIPP at 3 oz. in 100 gal. water

561. SOMOS, A.
Télikáposzta öntözési kísérletek eredményei. (**Results of irrigation trials with winter cabbage.**) [Russian and German summaries 1 and 1¼ pp. respectively.]
Agrártud. Egy., 1952 (issued 1954), **16**(3, Part 1): 3-25, bibl. 5.

Results of 3 years' trials have shown that irrigation increased cabbage yields by 280-430%. The best use was made of the water when applied at 25-50 mm. rates, and of the 2 methods of application tested flooding was better than sprinkling. Of the 450-500 mm. of water required during the growing period for producing winter cabbage, under the conditions of the experiment 230-250 mm. have to be provided by supplementary irrigation. The most crucial time for irrigation is during the early growing period in hot weather; when, as is customary, the crop is planted out at the end of June early July the best time to irrigate is July to August.

---

* Formerly *Sborn. čsl. Akad. Zeměd. Věd., Ser. A.*

562. NICHOLAS, D. J. D.
The application of rapid chemical tests to the diagnosis of mineral deficiencies in horticultural plants. III. Comparisons of tissue tests and total analyses for potassium, magnesium, calcium, phosphorus and nitrogen in potato and cauliflower.
J. hort. Sci., 1955, **30**: 260-7, bibl. 6.

Correlation co-efficients (*r* values) were determined for the major nutrients in fresh tissue extracts and in acid digests of cauliflower, var. Majestic. In 1953, K, Ca and P in extracts of cauliflower leaves made with either malonate or succinate are significantly correlated with total analysis. Nitrate N in the malonate extract has a significant *r* value with total nitrogen. The Mg in either extract is not correlated with the total content. Leaf lamina extracts of cauliflower show similar correlations with the total nutrient content as do the extracts of the midrib. [From author's summary.]—A.R.C. Unit of Plant Nutrition, Long Ashton Res. Stat.

563. BRANDENBURG, E., AND BUHL, C.
Über das Vorkommen von Molybdänmangel bei Blumenkohl in Westdeutschland und seine Verhütung. **(On the incidence of molybdenum deficiency in cauliflower in Western Germany and its prevention.)**
Z. PflKrankh., 1955, **62**: 514-28, bibl. 25, illus.

Molybdenum deficiency of cauliflower, in some cases severe, was found to be widespread in Western Germany, particularly on acid to slightly acid soils. Liming reduced the symptoms but did not completely eliminate them. Prophylactic applications of sodium molybdate at rates of 2-4 kg/hectare gave excellent results, especially in conjunction with calcium-ammonium nitrate as a source of nitrogen. Small-scale experiments showed that affected plants can still be cured if sodium molybdate is applied (25 mg. per plant) as soon as the first symptoms appear. Often the manifestation of deficiency symptoms in the field is due to Mb deficiency in the compost soil in which the seedlings were raised, especially where peat is a major constituent. The application of 0·4 g. sodium molybdate per square metre of seedbed or of 2-3 g. per cubic metre of soil is therefore recommended as a general precaution. [See also *H.A.*, 25: 2808.]

564. JENKINSON, J. G.
The incidence and control of cauliflower mosaic in broccoli in south-west England.
Ann. appl. Biol., 1955, **43**: 409-22, bibl. 7.

Cauliflower mosaic in south-west England is most prevalent where there is a sequence of brassica crops that overlap in time. Broccoli yields can be increased by using plants raised in seed-beds separated by half a mile from old infected plants. Surrounding seed-beds with crops of kale or barley decreased the incidence of mosaic even when the seed-beds were only 5 yds. from infected plants. Most plants infected at harvest contract infection after transplanting. A plant infected in the seed-bed or early in the growing season can produce a group of infected plants immediately around it, and almost as many farther away. Spread can occur in the same pattern from these secondarily infected plants. Loss of yield is correlated with the time plants are infected. Plants infected as seedlings produce little or no curd or seed, whereas those infected when nearing maturity yield almost as well as uninfected plants. The movement of alate aphids is positively correlated with the numbers of infected plants, and symptoms in field plants generally appear 8-9 weeks after infection. Cauliflower mosaic virus occurs in strains distinguishable by the severity of symptoms they cause. [Author's abstract.]—Seale Hayne Coll., Newton Abbot.

565. GLASSCOCK, H. H., AND MORETON, B. D.
Cauliflower mosaic in East Kent.
Agriculture, Lond., 1955, **62**: 270-4, bibl. 3.

During trials in East Kent, barrier crops have shown promise in the protection of cauliflower seed-beds from infective aphids. Barley gave the best results, but kale and beans also resulted in some reduction of mosaic incidence.

566. CADMAN, C. H.
Plant pathology.
A.R. Scot. hort. Res. Inst. Mylnefield, 1954-1955, 1955, pp. 24-7.

Cabbage root fly: Dieldrin increased the number and weight of marketable heads of cauliflower; only 8% of the treated plants were damaged, while 84% of untreated plants were severely damaged.

567. VAN DER LAAN, P. A.
Biological and chemical control of the diamond back moth (*Plutella maculipennis*) on cabbage in Indonesia.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

An account of the successful control of *Plutella maculipennis* by the Ichneumonid parasite *Angitia cerophaga*, and of *Crocidolomia binotalis* by the use of DDT.—Lab. Phytopathology, Wageningen.

568. DEAKIN, R. T.
Brussels sprouts for market.
Agriculture, Lond., 1955, **62**: 315-18.

A survey of sprout marketing methods was made, particularly those of the Bedfordshire and Evesham areas. The crop was grown on holdings of all sizes, and this factor is reflected by a wide variation in methods used. Many varieties are grown, but frequently growers maintain their own selections. Picking methods were the same on all holdings and crops were generally picked 3-5 times during the season. Grading or packing may be done either during or after picking; recently there has been a trend towards pre-packaging. Picking by piecework is usual. The average rate of picking direct into market containers was estimated at 4 units per man hour; with grading over riddles this was reduced to 3½ units per man hour, but was increased again to 4 units per man hour by machine handling at a central point. No standard containers are available, those most widely used being a non-returnable net holding 20 lb., and a returnable bag holding 28 lb.

569. DE BROUWER, W. M. T. J.
Brown colouring of cauliflower after cutting.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

Observations of the influence of high temperature, heating of wet heads, strong air current and irradiation by the sun, indicate that exposure to the sun's rays after harvesting is responsible for this phenomenon. It is suggested that cauliflowers should be covered after harvesting. No film so far tried has proved successful. One which is translucent and does not transmit ultra-violet rays is desirable.—Exp. Hort. Stat., Naaldwijk.

570. Lieberman, M., and Spurr, R. A.
Oxygen tension in relation to volatile production in broccoli.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 381-6, bibl. 14, illus.

Volatile products emanating from broccoli in atmospheres of 0, 1, 2·5, 5, 10 and 21% O_2 were studied. Ethylene was identified as an emanation under aerobic conditions but it was absent under anaerobic conditions. Under aerobic conditions the quantity of non-ethylenic volatiles was not very large and no identification of components could be made. In the oxygen-free atmosphere, however, the quantity of non-ethylenic volatiles produced was 10-20 times as great as in any of the oxygen atmospheres. Methyl mercaptan, acetaldehyde and ethyl acetate were tentatively identified as a part of the components present in broccoli volatiles evolved under anaerobic conditions. The relationship between evolution of ethylene and yellowing of broccoli is discussed.—U.S. Dep. Agric., Beltsville, Md., and Univ. Md., College Park.

571. Almon, L., and Sheet, O.
Research shows collards high in food value.
Miss. Fm. Res., 1955, **18**(6): 6.

Tables are given showing the vitamin and mineral contents of collards compared with those of other foods, the effect of cooking on their food value, and the maximum variations in food value due to soil nitrogen level.

Celery.

(*See also* 732b.)

572. Lowings, P. H.
Some storage rots of celery caused by *Centrospora acerina* and other fungi.
Plant Path., 1955, **4**: 106-7, bibl. 5, illus.

Considerable rotting developed in batches of early (self-blanching) and maincrop varieties of celery stored at 33° F. for up to 3 months. *Centrospora acerina* had occurred in almost every batch by the seventh or eighth week of storage. *Sclerotinia sclerotiorum* severely attacked a batch of early plants after 8 weeks in store, but main crop losses were less severe. *Botrytis cinerea* developed on many plants, and there was some evidence of infection by *Septoria apii-graveolens.*—Ditton Lab., D.S.I.R., E. Malling.

573. Banga, O., and van Bennekom, J. L.
Praktijkproeven knolselderij 1953-1954. (**Field experiments with celeriac, 1953-1954.**) [English summary 9 lines.]
Meded. Dir. Tuinb., 1955, **18**: 801-8, bibl. 1, illus.

Thirty Dutch selections of celeriac have been tested in the field at Wageningen. There was much variation in tuber shape and amount of leaf, and these factors have been used as a basis for classification. Uniformity and food value were also considered. Fifty per cent. of the selections were finally approved. Further field trials are being made with foreign varieties.—Inst. Vered. Tuinbgew., Wageningen.

Cucurbits.

(*See also* 54, 68, 732a, e, m, 733j, k.)

574. Kumazawa, S., Matumoto, M., and Fujieda, K.
Cucumber breeding. I. Breeding a cucumber bearing more fruit under long day and high temperature conditions. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **24**: 1-5, bibl. 10, illus.

Cucumber varieties Suyo, Manshuaki and Ochiai No. 1 were used as parents in breeding a cucumber which fruits all the year round. The new variety produces good quality fruit, and is insensitive to day-length and temperature.

575. Shimokawa, M., Ono, H., and Sudo, T.
Studies on the forcing of cucumber. II. Effect of size of tunnel and of growth stage of seedling at transplanting. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 60-6, bibl. 10, illus.

Japanese cucumber seedlings were planted in tunnels [trenches?] covered with vinyl film [see *H.A.*, 25: 549]. Among the conclusions drawn were that, (1) the narrower the tunnel, the higher is the maximum air temperature and the soil temperature, and the lower the minimum air temperature, and, (2) the best age for transplanting is 50 days old.

576. Phillips, E. L.
Spacings and rates of fertilization for cucumbers studied.
Miss. Fm Res., 1955, **18**(4): 8.

Tests made at the Coastal Plain Branch Experiment Station, Newton, Miss., on sand-clay soil, involved 4 rates of nitrogen and 4 plant spacings for the pickling cucumber Model. Under the high temperature and low moisture conditions prevailing the best yields were obtained with a 16-64-64 fertility level, supplying 16 lb. actual N per acre, and a 1 ft. spacing in the rows with rows 6 ft. apart.

577. Funamoto, H., and Masuda, S.
Studies on fractional applications of nitrogenous fertilizers in vegetable crops. III. Cucumbers. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1955, **24**: 62-8, bibl. 11.

The effects of fractional application of nitrogenous fertilizers (ammonium sulphate, ammonium nitrate and rape cake) on vine growth, flower number and yield of cucumbers was studied. In the ammonium sulphate plots ammonium and nitrate contents in the soil were maintained at a relatively high level until the latter part of the growing season. The best vine growth, largest flower number and highest yield were obtained on plots where the fertilizer was given in 5 applications; one application of the same total amount of fertilizer at planting showed the poorest results. A similar effect was obtained with the ammonium nitrate plots, but in general growth and yields were lower. Method of application had a less marked effect in the rape cake plots. The highest yield was in this case obtained where all the fertilizer was applied at planting, or in two applications.

578. Fröhlich, H.
Ertragsversuche mit Treibgurken zur Überprüfung des Klockbodens als Kulturerde. **(Yield experiments with cucumbers to test "Klock" soil as a medium.)**
Dtsch. Gartenb., 1955, **2**: 272-3.

Soil originating from turf sods of a "Klock" soil [a poor, alluvial clay] was compared with that from sods of a heavy loam soil for growing cucumbers. Both were mixed with sand, and lime, farmyard manure and mineral fertilizers were applied. After a period of composting, cucumbers were planted. Final figures showed that yields from the "Klock" soil were better than those from the loamy soil, possibly as a result of its more stable crumb structure.—Inst. Gartenb., Dtsch. Akad. Landw., Berlin. [See also Abstr. 689.]

579. van Koot, Y., and van Dorst, H. J. M.
Een nieuwe virusziekte bij komkommers. **(A new virus disease of cucumbers.)** [English summary ½ p.]
Tijdschr. PlZiekt, 1955, **61**: 163-4, illus.

A new virus disease, of the tobacco ringspot type, has been observed on frame cucumbers in South Holland. It is sap-transmissible but may be inactivated by treatment at 60° C. for 10 minutes. The symptoms do not develop in warm weather. There were indications that plants grafted on *Cucurbita ficifolia* were less susceptible to the disease than ungrafted plants.—Proefstat. Groent. Fruit. Glas. Naaldwijk.

580. Uschdraweit, H. A.
Das Grünscheckungsmosaik der Gurke. **(*Cucumis virus* 2.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, **7**: 150-1, illus.

The incidence of *Cucumis virus* 2 (*Marmor astrictum*) on cucumber is reported from Berlin. The symptoms are described and special sanitary measures are recommended in view of the infectivity of the disease.

581. Doolittle, S. P., and Beecher, F. S.
Effect of streptomycin formulations on angular leaf spot in cucumber.
Plant Dis. Reptr., 1955, **39**: 731-6, bibl. 3.

Streptomycin at 400 p.p.m. gave much better control of *Pseudomonas lachrymans* on cucumber than the same antibiotic at 300 or 200 p.p.m. or tribasic copper sulphate. Streptomycin alone and streptomycin plus terramycin were equally effective. As a protectant streptomycin at 200 and 300 p.p.m. was superior to the copper compound in 2 out of 3 tests.—Agric. Res. Serv., Beltsville, Md.

582. Lauenstein, A.
Untersuchungen über die Ursachen und eine Möglichkeit der Bekämpfung der Gurkenwelke an Gewächshausgurken. **(Research on the origin and possible control of cucumber wilt in glasshouse cucumbers.**
Arch. Gartenb., 1955, **3**: 133-60, bibl. 11, illus.

Two kinds of cucumber wilt have been studied, namely physiological and parasitic wilt. Physiological wilt may be attributed to at least 2 groups of environmental conditions, those promoting water loss and those inhibiting water uptake. The "irreversible" wilting which may result from the effects of these factors rarely occurs in a commercial nursery. Parasitic cucumber wilt is caused by *Fusarium* and *Verticillium* spp., which are soil-borne. Soil disinfection does not give satisfactory control. By grafting cucumber varieties onto the resistant rootstock, *Cucurbita ficifolia*, protection from the wilt was obtained and yields were increased.—Inst. Gartenb., Dresden-Pillnitz.

583. Bravenboer, L., and Manintveld, J. C.
Chemische bestrijding van vruchtvuur (*Cladosporium cucumerinum* Ell. et Arth.) bij platglaskomkommers. **(Chemical control of gummosis or scab of cucumbers.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 105-21, bibl. 16.

In practical experiments with 14 different fungicides to control *Cladosporium cucumerinum* on cucumbers under glass, Bulbosan and F55 (an organic mercury compound) proved the most effective. Some control was also given by Zineb and Phygon. Comparison of laboratory and practical tests showed that *Cladosporium* control could only be expected from fungicides with a strong vaporizing action.—Proefstat. Groent. Fruit. Glas, Naaldwijk.

584. Coe, D. M.
Streptomycin as a control for downy mildew of cucurbits.
Plant Dis. Reptr, 1955, **39**: 729-30, bibl. 2.

Agrimycin and tribasic copper sulphate were tested alone and in mixture against *Pseudoperonospora cubensis* on cucumber, 7 sprays being given at intervals of 4-5 days from late May to late June. Agrimycin at 100 p.p.m. plus 5% copper sulphate gave the best result, namely, a disease control index of 6·88 out of a maximum of 10. The indexes for the agrimycin component alone, the sulphate component alone and the control were 3·63, 6·0 and 2·25 respectively.—Everglades Exp. Stat., Univ. Fla, Ft. Pierce.

585. Mayer, K.
Gurkenschäden durch Dipterenlarven. **Damage done to cucumber by fly larvae.**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, **7**: 149-50, bibl. 12.

The death of many cucumber plants in the field near Naumburg, with symptoms similar to those caused by *Fusarium* wilt, was found to be due to the presence of dipterous larvae in the stem.

586. Jones, A. H., and Ferguson, W. E.
Further studies on the curing of cucumbers and the development of green color in finished pickles.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 21.

Heavy applications of copper to either the plants or the soil in the form of sprays resulted in a marked increase in green colour of cured cucumber.—Sci. Serv., Ottawa.

587. Mohr, H. C., Blackhurst, H. T., and Jensen, E. R.
F_1 hybrid watermelons from open-pollinated seed by use of a genetic marker.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 399-404, bibl. 12, illus.

Seed obtained from natural cross-pollination of interplanted inbred watermelon lines can be utilized for production of commercial F_1 hybrids when one of the interplanted lines used possesses a recessive genetic marker for non-lobing of the leaf. This marker permits removal of plants resulting from self-pollination (non-hybrid) in the normal thinning operation. The obvious advantage of the method is the reduction in the cost of seed. Data are presented showing the percentages of hybrids resulting from field interplantings with various spacings and arrangements of the two parent lines using the non-lobed leaf line as the seed parent. The maximum percentage of hybrids obtained was 36%. A number of modifications of the present technique are suggested which, singly or in combination, should increase the percentage of cross-pollination above the maximum obtained in this experiment without greatly increasing the cost of seed production. The method of producing F_1 hybrids described could be used with a different recessive genetic marker, provided it was expressed in the seedling state. [From authors' summary and conclusions.]—Texas agric. Exp. Stat., College Station.

588. Buzulin, G. S.
Outdoor varieties of watermelon and melon for the central zone of the U.S.S.R. [Russian.]
Priroda, 1955, **44**(7): 105-7, bibl. 1, illus.

Mičurin's method of breeding and selection is discussed with special reference to melons and water-melons, and some varieties are described. A valuable, hardy variety of watermelon, Mičurinskiĭ 01, was developed from Melitopoljskiĭ 142 × Stoks by holding the hybrid seed at 25-28° C. for 50 hours and then sowing outdoors in an air temperature of 8-10° C. Barely 3% of the seeds germinated but some of those produced good plants ripening their fruits in early August, and from these selection was made for quality and earliness.

589. Yamasaki, K., Kamihama, T., and Nonaka, M.
The effect of bed soil composition on the production of greenhouse melons. (Preliminary report.) [Japanese, with English summary $\frac{3}{4}$ p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 57-68, bibl. 22, illus.

Three varieties of greenhouse melon were grown in 3 types of soil, namely a paddy field subsoil, a clay and a medium sand subsoil. These soils were adjusted to nearly the same fertility level by the addition of chemical fertilizers and compost. The growth of the plants and the size and soluble solids content of the fruits were considerably greater on the beds composed of medium sand than on the others, probably because of its good aeration and comparatively high water-holding capacity. There was no marked difference in response between the varieties. It is concluded that a soil which does not collapse or become compact with frequent watering is desirable for greenhouse melons.

590. Aycock, R.
A comparison of two methods of row fumigation for control of root knot of cantaloupe in South Carolina.
Plant Dis. Reptr, 1955, **39**: 607-10.

The application of Dowfume W-85, Dowfume W-40, and DD applied as a single stream in the furrow followed by immediate ridging significantly reduced galling caused by *Meloidogyne incognita* var. *acrita* and significantly increased yields of marketable cantaloupe fruit. Two streams of these fumigants applied in furrows 12 inches apart significantly reduced galling but resulted in no increase in yield over that obtained where the 1-stream method of application was employed. [Author's summary.]—S.C. agric. Exp. Stat.

591. Nishida, T., and Bess, H. A.
A possible aid to melon fly [*Dacus cucurbitae*] control: protein hydrolysates of yeast.
Hawaii Farm Sci., 1955, **4**(2): 6-7.

Experimental weekly or twice-weekly sprays of 1 lb. protein hydrolysate of yeast plus 2 lb. 25% malathion wettable powder per 100 gal. water have shown promise.

592. Takashima, S., and Hatta, S.
Effect of phytohormones on parthenocarpy in cucurbits. [Japanese, with English summary 12 lines.]
J. hort. Ass. Japan, 1955, **24**: 59-61, bibl. 4.

The effect of phytohormones on parthenocarpy was studied with varieties of *Cucurbita maxima*, *C. pepo* and *C. moschata*. The most effective hormone used was NAA at 0·0005–0·001%. Heteroauxin induced parthenocarpy in *C. pepo* and *C. moschata*, but not in *C. maxima*. Treatments with 0·02% Tomatotone and with 0·1-0·2% ACA solution did not induce parthenocarpy in the three cucurbits.

593. Sinnott, E. W.
Stalk diameter as a factor in fruit size.
J. Arnold Arbor., 1955, **36**: 267-72, bibl. 2.

Diameters of developing fruits and fruit stalks were measured daily in races of *Cucurbita pepo* differing widely in mature fruit size. Growth of the stalk is slower and ceases earlier in small-fruited races than in large-fruited ones. In both flowering occurs when the ratio of ovary diameter to stalk diameter has reached a specific size. Artificial reduction of stalk diameter by cutting away part of it or by constricting it had no appreciable effect on fruit growth. Size of fruit does not depend on cross-sectional area of the stalk, but there seems to be a correlation between the growth pattern of of the stalk and that of the fruit, which is related to fruit size. [Author's summary.]

594. Wright, J. M., and Decker, G. C.
Laboratory and field tests to control squash bug.
J. econ. Ent., 1955, **48**: 250-5, bibl. 4, illus.

In laboratory tests involving application of 11 insecticides, parathion was most toxic to adult squash bugs, *Anasa tristis*, but, when the bugs were exposed to 7-day old deposits of 5 materials, dieldrin was found to be the most effective. Results of field trials in pumpkin have shown that one application of dieldrin at 0·5 lb. per acre gives good control of squash bug.

Legumes.

(*See also* 25, 30, 35-37, 44, 47, 48, 50, 56, 57, 60, 61, 90-93, 95, 733h.)

595. PHILLIPS, E. L.
Research on peas, beans, potatoes in Coastal Plain.
Miss. Fm Res., 1955, **18**(5): 7.

The results of southern pea and lima bean variety tests in Mississippi are tabulated. Particular promise was shown by Miss. S-1, a wilt-resistant pea of the Crowder type, soon to be released by the Mississippi Agricultural Experiment Station.

596. WIEBOSCH, W. A., AND BUISHAND, T.
Landelijke beproeving van enige stamslabonenrassen. **(National trials of some dwarf bean varieties.)** [English summary ½ p.]
Meded. Proefstat. Groent. Volle Grond Ned., Alkmaar **2**, 1955, pp. 36.

The results of over 80 field trials with dwarf bean varieties in Holland are surveyed. Stringless Dubbele Witte is the most widely-grown outdoor variety and has the most desirable market qualities. New varieties, resistant to common bean mosaic or apical necrosis, were tested, but many were susceptible to other diseases or were of poor quality. The growing season during which normal yields can be obtained is short, and attention should therefore be directed to the development of varieties adapted to conditions of early or late sowing. The incidence of halo blight (*Pseudomonas phaseolicola*) occurred chiefly on calcareous alluvial soils; anthracnose (*Colletotrichum lindemuthianum*) was more general on diluvial soils. Yields on light soils were higher than those on clay soils.

597. CRANG, A., AND STURDY, M.
A comparison of some varieties of vegetables preserved by canning and by freezing: progress report. III.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 187-91, bibl. 2.

Quality assessments were made of 3 varieties of bean and 6 varieties of pea preserved by canning and freezing. The effect of stage of maturity on quality of the preserved product was also investigated. [See also *H.A.*, 24: 408].

598. STRACHAN, G.
Factors influencing the quality of dry beans for processing.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 15.

Seven varieties of dry beans were tested for water-imbibing properties, size ranges, ability to soften after soaking and processing qualities. Michelite, Ontario and Robust were considered most suitable for commercial processing, although a Burbank strain, which is slightly too large for processing, had the best flavour.—Exp. Fm, Lethbridge, Alberta.

599. BUISHAND, T.
Enige ervaringen met het veredelen van bonen. (*Phaseolus* spp.). I. **(Some results of bean breeding.)** [English summary 1½ pp.]
Meded. Proefstat. Groent. Volle Grond. Alkmaar **1**, 1955, pp. 48, bibl. 15, illus.

The technique of pollination and some factors influencing the results of breeding under glass are described. A *Phaseolus* breeding programme started in 1953 aimed at increasing the number of factors for disease resistance, improving yield, quality and growth characters, and producing varieties adapted to low growing temperatures. A large number of single crosses were made, and selection started in the F_2 generation. The F_1 hybrids have been tested for various characters to determine their genetical behaviour, and results are summarized. Results from an interspecific cross between *Phaseolus vulgaris* and *P. dumosus* are given. The percentage of successful crosses varied from 0 to 38%.

600. FREYTAG, G. F.
Variation of the common bean (*Phaseolus vulgaris* L.) in Central America.
Diss. Abstr., 1955, **15**: 679, being *Publ.* 11560, of 136 pp.

A collection of 100 Central American beans was grown and studied for 2 years. Observations indicated that bean variation has originated from at least 2 major sources. In a more or less pure form these are (1) *P. vulgaris* complex, which is an elongate-seeded bean of determinate growth and (2) an unknown species called Tropical Black, which is a small, equidimensional black-seeded bean, short and vining, with heavily pigmented purple flowers. Descriptions are given of these extreme types and of commonly occurring intermediates.—Wash. Univ.

601. TSITSIN, N. V.
My researches in distant hybridization.
Sci. and Cult., 1955, **21**: 139-48, bibl. 3, illus.

Including notes on grafting peas and beans onto yellow acacia, and tomato and egg plant onto *Cyphomandra*.

602. HONMA, S.
A technique for artificial culturing of bean embryos.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 405-8, bibl. 10, illus.

An attempt was made to find a method of culturing *in vitro* "non-viable" or "physiologically sterile" bean embryos resulting from *Phaseolus vulgaris* × *P. acutifolius* crosses. Excised embryos grown in 2 or 4% sucrose nutrient agar medium failed to produce a root system that could withstand transplanting. By using a liquid nutrient medium, however, and gradually reducing the sucrose level from 4 to 0% a small percentage of the embryos developed into mature plants.—Univ. Neb., Lincoln.

603. STERLING, C.
Embryogeny in the lima bean.
Bull. Torrey bot. Cl., 1955, **82**: 325-38, bibl. 50, illus.

[Previous papers in this series have been abstracted in *H.A.*, 24: 3869 and *H.A.*, 25: 2871.] Early embryogeny in *Phaseolus lunatus* closely resembles that of other members of the genus. No relationship was found between anatomical development and the stage of optimum organoleptic quality.—Univ. Calif., Davis.

604. Loewenberg, J. R.
The development of bean seeds (*Phaseolus vulgaris* L.).
Plant Physiol., 1955, **30**: 244-50, bibl. 32.
The development of bean seed.
Diss. Abstr., 1955, **15**: 680, being *Publ.* 11417 of 48 pp.

The development of bean seed from 11 days after flowering to maturity is described biochemically. Measurements of individual seeds indicated that the greatest increases in dry and fresh weight and nitrogen and phosphorus contents occurred 3-5 weeks after flowering. This period of maximum growth approximately coincided with the period of most rapid O_2 uptake. Cell counts on developing cotyledons indicated that cell division ceased about 3 weeks after flowering and after this time the average cotyledon greatly increased in size. Cells of various origins had similar rates of O_2 uptake, in spite of differences in fresh and dry weights.—Univ. Pa. Philadelphia.

605. McKee, H. S., Robertson, R. N., and Lee, J. B.
Physiology of pea fruits.
Aust. J. biol. Sci., 1955, **8**: 137-63, bibl. 26.

Pea fruits from two crops were sampled at different times from flowering. Changes in the fresh weight, dry weight, starch, soluble carbohydrate, protein nitrogen and soluble nitrogen in both seeds and hulls were followed in two seasons and related to the changes in cell volume in the seeds. In one season respiration rates and phosphate, pectin and ascorbic acid contents were also investigated. The seeds gained more carbohydrate and nitrogen than was lost by the hulls. Starch and protein were synthesized rapidly by the seeds. The increase in starch content in the seeds was followed by a decrease in soluble carbohydrate content, after which the seed ceased to accumulate water. These metabolic changes are discussed in the light of recent biochemical knowledge, and in relation to more detailed biochemical investigations in progress. [Authors' summary.]—Div. Food Pres., C.S.I.R.O., and Bot. School, Univ. Sydney.

606. Inoue, Y.
Studies on the reproductive physiology of common beans, *Phaseolus vulgaris* L. IV. Some relations between flower bud differentiation, flowering and fruiting in common beans. [Japanese, with English summary ¼p.]
J. hort. Ass. Japan, 1955, **24:** 56-8, bibl. 16, illus.

In Kentucky Wonder (a tall variety) about 20-30% of the flower buds which had differentiated by the 45th day after sowing developed to flower. Pod-setting occurred in 20-35% of the total flower number, which means that only 4·5-10·8% of the flower buds finally fruited. Competition for nutrients and high temperatures appeared to be the chief causes of flower and pod drop. Many effective flower buds occurred near the tenth node. With delayed sowing the percentage of pod set was lowered. Anthesis occurred mainly between 5 and 7 a.m.

607. Paton, D. M., and Barber, H. N.
Physiological genetics of *Pisum*. I. Grafting experiments between early and late varieties.
Aust. J. biol. Sci., 1955, **8**:231-40, bibl. 19.

The grafting of genetically early scions of *Pisum sativum* var. Massey on genetically late stocks (var. Telephone) leads to flowering at a higher node. In reciprocal grafts, the scions of the late variety flower at an earlier (lower) node. Control grafting, i.e. scions to stocks of the same variety, has no effect on Massey scions but leads to flowering at a lower node in the Telephone scions. Removal of cotyledons as soon as possible after germination (3-7 days) has no effect on Massey but leads to earlier flowering in Telephone. These results are best explained on the assumption that the genetically later variety produces a flower inhibiting (or delaying) substance which can pass a graft union and alter the flowering behaviour of genetically early scions. [Authors' summary.]—Bot. Dep., Univ. Tasmania.

608. Highkin, H. R.
Flower promoting activity of aqueous plant diffusates.
From abstr. in *Plant. Physiol.*, 1955, **30** (Suppl.): xxi.

Pea diffusates decreased the number of nodes to the first flower in peas. There was about 25% decrease in the number of nodes to the first flower in those peas (variety Zelka) which are naturally vernalizable as compared to unvernalized controls. The effect is similar to that resulting from a maximum cold treatment.—Calif. Inst. Technology, Pasadena.

609. Brian, P. W., and Hemming, H. G.
The effect of gibberellic acid on shoot growth of pea seedlings.
Physiol. Plant., 1955, **8**: 669-81, bibl. 10.

The growth rate of shoots of seedlings of the dwarf pea variety Meteor is significantly increased by application of 0·01 µg. gibberellic acid per plant. Higher doses produce no greater effect if measurements are made shortly (4 days) after treatment, but in longer term experiments there is a linear relation between log dose and growth response in the dose range 0·01-0·32 µg. per plant. The growth rate of plants receiving a single dose increases relatively to that of untreated plants for a period, but eventually falls again to the growth rate level of untreated plants. The larger the dose (in the range 0·01-10·24 µg.) the longer the period of enhanced growth rate is prolonged. Slow growing varieties of pea, e.g. dwarf varieties, respond more to application of gibberellic acid than fast-growing varieties, e.g. tall varieties. Suitable doses of gibberellic acid virtually eliminate the difference in growth between tall and dwarf varieties. Indolylacetic acid has a qualitatively similar but much smaller effect. In an experiment with 11 varieties of pea the response to gibberellic acid, as measured by a "response index", was linearly and inversely related to the log growth rate of a given variety at the time of treatment. [Authors' summary.] [See also *H.A.*, 25: 1220.]

610. Grobbelaar, N.
Growth and nitrogen metabolism of certain legumes, with special reference to the effects of controlled environments.
Diss. Abstr., 1955, **15**: 962, being *Publ.* 11904 of 389 pp.

The occurrence of high concentrations of homoserine in pea shoots was confirmed by paper chromatographic techniques. The effects of different controlled environments on growth and N composition of 4 pea varieties was studied. Temperature treatments for 8 hours a day had little effect on plants, while 16-hour treatments caused pronounced growth responses. Under 16-hour treatments plants at lower temperatures developed more slowly, aborted fewer floral buds, and were heavier and more robust than plants at higher temperatures. Plants receiving 8-hour photoperiods (sunlight) were more branched than those receiving 16-hour photoperiods (artificial light). Green Feast, Swartbekkie and Unica varieties behaved as long-day plants, by producing first flower primordia at lower nodes under 16-hour photoperiods than under 8-hour photoperiods. The nodal position of the first flower primordia was unaffected by photoperiod in Vinco. Flower initiation was delayed in Green Feast, Swartbekkie and Unica at high temperatures in the 16-hour day treatment.

611. Nieman, R. H.
Salt respiration in the roots of garden pea.
Plant Physiol., 1955, **30**(Suppl.): xxxii.

The influence of K^+, Ca^+, Cl^-, and $SO_4^=$ ions on the oxygen uptake and carbon dioxide output of excised pea roots has been studied. Respiration increased steadily as the concentration of a KCl solution was increased from 0·001 M to 0·01 M. In single salt solutions of the above ions maximum stimulation was observed with solutions containing the Cl-ions.—Univ. Chicago.

612. Schneider, A.
Über den Reifeablauf von Gemüseerbsen und die Bestimmung des optimalen Pflücktermins mit Hilfe des Texturemeters. (**On the course of ripening in garden peas and the determination of optimum picking date with aid of the texture meter.**)
Züchter, 1955, **25**: 302-9, bibl. 10.

(1) In 1951 the course of maturation was studied in 36 garden pea varieties and strains by periodical determinations of the dry matter content and firmness of ripening seeds. Firmness was determined by a home-made apparatus constructed in accordance with the principle of the American texture meter. In view of its simplicity this method is recommended as an aid to determining maturity and optimum picking date. (2) A very close, positive correlation exists between increase in dry matter content and firmness, the average value for all varieties being $r = + 0{\cdot}93$. (3) Under certain climatic conditions several varieties showed a "retrograde" course of ripening which manifests itself in a decrease in dry matter content, firmness and absolute mean dry weight of the seed, while total sugar content increases. It is assumed that the carbohydrates stored in ripening seeds can be hydrolysed and translocated if the need arises. (4) Dry matter content is affected sooner than firmness by such "retrograde" development. This explains the observation that the correlation existing between firmness and alcohol-insoluble constituents is closer than that between firmness and dry matter content. (5) The degree of firmness in ripening seeds is a varietal characteristic. [Translation of author's summary.]

613. Strachan, G.
Maturity studies of snap beans and sweet corn.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 15.

Physical and chemical analyses were made on the major constituents. Seed/pod ratios appear to be the best index of bean maturity.—Exp. Fm, Lethbridge, Alberta.

614. Hope, G. W., and Leefe, J. S.
The relationship of yield to quality in canned peas.
Abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, pp. 12-13.

The effect of harvest date upon the yield, size of peas and maturity of the 3 varieties Perfection, Canners King and Pride was investigated in a replicated block experiment, using 3 harvest dates and 3 planting dates. The 3 varieties did not differ significantly in yield or in hardness as measured by the Christel texturemeter. Significant differences between varieties were found in alcohol insoluble solids content. The correlation coefficient between texturemeter reading and alcohol insoluble solids content was found to be 0·886. The regression of yield on texturemeter reading was found to be 68 lb. per acre per unit of texturemeter reading. The best quality/wastage relationship was obtained at the second sowing/second picking date, at which time the texturemeter readings were in the range 100-115. The heat units accumulated in reaching this point in development were: Perfection 32,580; Canners King 34,896 and Pride 35,508.—Exp. Fm, Kentville, N.S.

615. Linck, A.
Studies on the distribution of phosphorus-32 in *Pisum sativum*, in relation to fruit development.
Diss. Abstr., 1955, **15**: 951-2, being *Publ.* 12177 of 122 pp.

Microscopical examination of Alaska peas showed that there was a developing embryo in almost every ovule 4-7 days after anthesis; differences in ovule and embryo size became apparent 7 days after anthesis. The distribution patterns of phloem-transported materials were studied using P^{32} applied to the leaves. These distribution patterns were found to be highly specific. Distribution from a lower leaf node (5th or 7th) was chiefly downwards with little or no accumulation in the pods. In mature plants a relatively small amount of the translocation stream from the 5th node accumulated in the roots. There was no significant accumulation of P^{32} by the flower before anthesis. About 4-6 days after anthesis a considerable amount of P^{32} was translocated to the carpel, sepals, and ovules; there was also an accumulation of labelled materials in the stem above and below the node of entry. Removal of the first pod or its mature seeds resulted in a diversion of the translocation stream to the second pod, and to the stem above and below the leaf to which the P^{32} was applied. Movement of the P^{32} from the leaf was almost stable 8 hours after application, when the first pod contained about 90% of the total P^{32} activity. When the metabolic activity of the first and only pod was lowered by cooling, the movement of P^{32} to all plant parts was restricted. The presence of another uncooled pod attracted the P^{32} stream. A "high" temperature treatment (34-30° C.) given to the first pod caused no reduction in P^{32} accumulation.

616. Howard, H. H., and Bonner, W.D.
Mineral nutrition and its relation to organic acid metabolism.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxii.

Red kidney beans were grown for 6 weeks in nutrient solutions deficient in K, P, S, N, Mg or Ca. Individual acids in dried and ground samples were then determined. After 2 weeks total acids were 60% greater in P-deficient cultures than in N-deficient cultures. After 6 weeks they were 270% greater.—Dep. Botany, Cornell Univ., Ithaca.

617. Ozaki, C. T.
The relative effectiveness of foliar applications of several manganese sources in correcting manganese deficiency.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 313-16, bibl. 5, illus.

In experiments using snap beans and crowder peas the relative effectiveness of the Mn (carriers) was dependent upon the source, the amount used and the crop sprayed. Manganese sulfate, applied at rates of 3 lb. per 100 gal., was more effective in correcting deficiency in beans than sprays containing equivalent amount of Mn from the oxide, dioxide, oxysulfate or the EDTA forms. The oxide, oxysulfate and EDTA forms resulted in significantly higher yields of beans than the dioxide. Manganese dioxide applied at 9 lb. per 100 gal. corrected visual symptoms of Mn deficiency in Alabama crowder peas but not in snap beans. No significant differences in growth of vines or yield of crowder peas were found among the various sources of Mn used. [Author's summary.]—Fla Everglades Exp. Stat., Belle Glade.

618. Quantz, L.
Viruskrankheiten der Hülsenfrüchte. **(Virus diseases of legumes.)**
Flugbl. biol. Bundesanst. Braunschweig **76**, 1955, pp. 8, illus.

The symptoms and transmission of virus diseases of *Phaseolus vulgaris*, peas, field beans [*Vicia faba*] and fodder legumes are described. In general, some control may be obtained by (i) removal of sources of infection, including isolation from overwintering legumes and use of healthy seed; (ii) early sowing, and spraying with systemic insecticides to reduce aphid attack; (iii) breeding of resistant varieties; (iv) growing a healthy crop by adequate cultural methods.

619. Douglass, J. R., Romney, V. E., and Jones, E. W.
Beet leafhopper control in weed-host areas of Idaho to protect snapbean seed from curly top.
Circ. U.S. Dep. Agric. **960**, 1955, pp. 13, bibl. 4, illus., 10 cts.

A project was started in Idaho in 1949 to determine whether the snap bean seed crop could be protected from curly-top infection by destroying the leafhopper virus vectors (*Circulifer tenellus*) in their spring breeding grounds in the desert before they moved into the cultivated areas. About 2,600 acres of weed-host area were sprayed with pyrethrum, but the percentage of infected bean plants was not below that expected; it was considered that the area sprayed had been too small. In 1950 and 1953 approximately 15,000 and 11,350 acres respectively of heavily infested weed-host area were sprayed with DDT from turbine blowers at rates ranging from 0·5 to 0·85 lb. DDT in 2 gal. emulsion per acre. Incidence of curly-top in snapbeans was reduced by 41% and 83% respectively below that expected. Reductions of 69 and 95% were similarly obtained in Great Northern U.I. 123 bean plants. It is concluded that it is possible by such means to protect beans from serious infection in years when beet leafhoppers are numerous. [See also *H.A.*, 25: 617.]

620. de Fluiter, H. J., and Hubbeling, N.
Waarnemingen over topvergeling bij erwten. **(Observations on top yellows of peas.)** [English summary ¾ p.]
Tijdschr. PlZiekt., 1955, **61**: 165-75, bibl. 18, illus.

A brief survey of observations and investigations on top yellow of peas is given, and its occurrence in the Netherlands is discussed. Experiments have shown that pea aphids (*Acyrthosiphon pisum*) collected from diseased peas, broad beans, lucerne and white clover transmitted the disease to healthy peas and broad beans. *Macrosiphum euphorbiae* bred on healthy plants and allowed to feed for 1 week on diseased peas also transmitted it. The best control method appeared to be the use of resistant varieties.—I.P.O., Wageningen.

621. Rudorf, W.
The transference of resistance to bean mosaics from *Phaseolus coccineus* to fertile hybrids obtained from *P. vulgaris* × *P. coccineus*.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.

A description of what is meant by the term extreme resistance, symbol ri, is followed by an account of the limited but promising results so far achieved.—Max Planck Inst., Voldagsen.

622. Schuster, M. L.
A method for testing resistance of beans to bacterial blights.
Phytopathology, 1955, **45**: 519-20, bibl. 5, illus.

Water-soaking of bean leaves by close atomizing in the greenhouse or pressure spraying in the field enabled the bacteria to enter the leaves and cause infection.—Neb. agric. Exp. Stat., Lincoln.

623. Zaumeyer, W. J.
A bacterium from beans antagonistic to *Xanthomonas phaseoli* and *Corynebacterium flaccumfaciens*.
From abstr. in *Phytopathology*, 1955, **45**: 466.

A bacterium tentatively identified as *Bacterium herbicola* that showed antibiosis against a number of bacterial plant pathogens was isolated from bean leaves infested with *X. phaseoli* collected in Colorado and Nebraska in 1954.

624. Dekker, J.
Antibiotica bij de bestrijding van plantenziekten. **(Antibiotics for the control of plant diseases.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 623-38, bibl. 70, illus.

A report is included of trials in which pea seeds were soaked for 24 hours in a culture-fluid of *Streptomyces rimosus*. The fungus *Ascochyta pisi*, which was present in the seed, was killed. No injurious effect on pea seed germination was observed at concentrations of 100 p.p.m. The toxic agent was rimocidin with which further trials were made. After seed treatment with rimocidin slurry, the occurrence of seed-borne diseases, on a heavily-infected, glasshouse plot of Dopper Eminent, was reduced from 40% to 1·5%. There were indications that the effect of rimocidin was stronger at lower temperatures.—Lab. Phytopath., Wageningen.

625. Bremer, H.
Fungizidbehandlung der Brennflecken bei Bohnen. **(The fungicidal treatment of anthracnose of beans.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, **7**: 129-31, bibl. 5, illus.

In preliminary trials seed treatment of infected bean seed with two as yet unnamed proprietary chemicals combined with 3 applications of zineb during the growing season showed great promise for the control of *Colletotrichum lindemuthianum*.—Inst. f. Gemüsebau u. Unkrautforsch., Neuss-Lauvenburg.

626. Wallen, V. R.
The effect of storage for several years on the viability of *Ascochyta pisi* in pea seed and on the germination of the seed and emergence.
Plant. Dis. Reptr, 1955, **39**: 674-7, bibl. 6.

In tests involving 18 samples of pea seed, varying in age from 2 to 13 years, it was demonstrated that in most varieties that had been stored for about 7 years seed-borne infections of *Ascochyta pisi* Lib. were eliminated without significant loss of germinative capacity of the seed or lack of emergence of seedlings. It is proposed that this finding can be used as a practical means of controlling the leaf and pod spot disease of peas arising from seed-borne infections. It may also be employed with seed which has failed to obtain foundation status because of *A. pisi* infections, by making it possible to qualify the seed for certification after a period of storage. [Author's abstract.]—Bot. Plant Path. Lab., Sci. Serv., Canada Dep. Agric., Ottawa.

627. Revilla, V. A., and Vargas S., R., and Sánchez A., J. L.
Control del oidium del frijol. **(Bean mildew control.)**
Inf. mens. Estac. exp. agric. La Molina, Lima. 1955, **29**(333): 13-18.

Of 10 fungicidal sprays and dusts tested against *Erysiphe polygoni* on Panamito beans, sprays of 0·4% Thiovit and 0·12% Karathane gave the best control, namely, 5 and 10% infection respectively compared with 90% in the control.

628. González B., J., and Llosa B., C.
Insectidas contra los insectos que atacan al frijol. **(Insecticides for the control of insects attacking beans.)**
Inf. mens. Estac. exp. agric. La Molina, Lima, 1955, **29** (331): 1-3.

Eight insecticides were tested against *Epinotia* sp. and *Laspeyresia* sp. Either 0·5% DDT wettable powder, 0·1% endrin concentrated emulsion or 0·025% methyl folidol concentrated emulsion is recommended.

629. Fox, C. J. S.
Control of the pea aphid with malathion in Nova Scotia.
A.R. Ont. Ent. Soc., 1954, 1955, pp. 40-1, bibl. 2.

In Nova Scotia excellent control of the pea aphid was obtained with a spray containing 24 fl. oz. of 50% malathion emulsifiable concentrate or with 35 lb. of 4% malathion dust per acre. The dust was superior in initial mortality and duration of effectiveness. Chemical analysis of the plants 13 and 15 days after application showed no residue of malathion. No difference in tenderness or taste of the canned peas attributable to the insecticide was detected. [Author's summary.]—Sci. Serv. Lab., Kentville, N.S.

630. Brett, C. H., and Brubaker, R. W.
Rotenone resistance in the Mexican bean beetle.
J. econ. Ent., 1955, **48**: 343, bibl. 2.

In North Carolina the Mexican bean beetle [*Epilachna varivestis*] developed resistance against rotenone, and it is suggested that this pest should now be controlled with other materials [such as malathion, see *H.A.*, 24: 2707].

631. Light, W. I. St. G., and Gould, H. J.
Experiments on control of bean seed flies.
Plant Path., 1955, **4**: 58-9, bibl. 3.

Treatments with γ-BHC, thiram and aldrin were compared on a bean crop for their effect on the larvae of *Delia* spp. The best control was obtained by a combination of 1½% aldrin dust applied to the drill, with a thiram seed dressing. A combined seed dressing of γ-BHC and thiram was almost as effective.—N.A.A.S., Wye.

632. Bremer, H., and Orth, H.
Fortgesetzte Untersuchungen zur Bekämpfung der Bohnenfliegen. **(Further studies on the control of the bean seed fly.)**
Reprinted from *Anz. Schädlingsk.*, 1955, **28**: 138-9, bibl. 3.

The cheapest and best control of bean seed fly (*Phorbia* spp.) was obtained by seed treatment with a preparation containing lindane and mercury. With the use of a sticker the concentration of the preparation could be reduced by half to 0·125%. Good results were obtained when sowing was done in May, June and August.—Inst. Gemüsebau u. Unkrautforschung, Neuss-Lauvenberg. [For earlier work see *H.A.*, 25: 1714.]

633. Gough, H. C.
***Thrips angusticeps* Uzel attacking peas.**
Plant Path., 1955, **4**: 53, illus.

Damage to peas by *Thrips angusticeps* is usually seen in April, and causes delayed flowering and podding with reduced yields. Most attacks have been recorded in crops following brassicas or linseed. In one heavily infected field 5% DDT dust appeared to give good control.—N.A.A.S., Cambridge.

634. Tang, R. C-W.
Defoliation of dry beans.
Proc. 9th annu. Mtg N.E. Weed Control Conf. 1955, New York, pp. 187-91, bibl. 1.

Beans treated with defoliants, in particular endothal and Shed-A-Leaf [KOCN], showed significantly better defoliation or desiccation than untreated beans. Different gallonages and different pressures used in applying defoliants had no significant effect on defoliation when considered separately; the interaction between pressure and gallonage, however, was significant. Low gallonage or high pressure generally caused more desiccation than high gallonage or low pressure. After treating with defoliants, the more mature plants had higher percentages of defoliation and less desiccation than immature plants.—Cornell Univ.

635. Phillips, W. M., and others.
Chemical drying and pre-harvest weed control.
Res. Rep. 11th annu. N. Centr. Weed Control Conf., 1954, Fargo, N. Dak., pp. 137-9.

Of 6 abstracts received for this section one deals with drying edible field beans. Beans were combine harvested much more easily from plots treated with PCP, endothal magnesium chlorate or a sodium chlorate-soluble borate mixture than from untreated plots which had tough green vines.

Mushrooms.

(*See also* 36, 732w, 733f.)

636. Rasmussen, C. R.
A new method to obtain improved yields in mushroom-growing, *Psalliota bispora.*
From summary Pap. 14th int. hort. Congr. 1955, Scheveningen, *see note p. 4.*
Some experiments in Denmark.
Bull. Mushroom Grs' Ass., 1955, No. 70, pp. 774-81, bibl. 4.

An investigation is described on methods of how best to stimulate yield of mushrooms grown on long racing stable manure supplemented by varying amounts of fresh manure, artificials and gypsum. Clear cut results were achieved and the importance of using an effective peak heating was demonstrated.—Mushroom Res. Stat., Roy. vet. agric. Coll., Copenhagen. [See also *H.A.*, 25: 1726.]

637. Langkramer, O.
Několik poznámek ke způsobům získávání čistých kultur podhoubi žampionu (*Agaricus*) ze spor. **(Notes on methods of obtaining pure cultures of mushroom spawn from spores.)** [Russian summary ½ p.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Vyroba,* 1955, **28**: 125-32, bibl. 8, illus.

Of the media used for culturing *Agaricus* spores, 5% malt extract and 9% malt extract agar at pH 5·5 were found to be the most satisfactory. Additions of vitamins and growth substances to the media were also considered.

638. (Sinden, J. W.)
Disease control and sanitation programme for mushroom nurseries.
Bull. Mushroom Grs' Ass., 1955, No. 71, pp. 832-41.

A summary is given of a lecture delivered at the Fourth Annual Mushroom Industry Exhibition in 1955. Prompt and thorough control of specific diseases when they make their appearance is advocated rather than reliance on general hygiene as a preventive measure. Examples of specific control measures are given for *Myceliophthora* or a yellow mould, *Ditylenchus* and La France disease.

639. Moreton, B. D., and John, M. E.
The mushroom phorid fly epidemic of 1953.
Plant Path., 1955, **4**: 9-11, bibl. 3.

The species and occurrence of *Megaselia* on mushroom farms in 1953 are described. Normal fumigation with BHC, DDT and parathion did not give adequate control. Dusting with BHC, DDT and aldrin gave some measure of control. Malathion gave promising control, both when mixed with the compost and when applied as a spray to buildings and beds.—N.A.A.S., Wye. [See also H.A., 24: 2743.]

640. Hornstein, I.
Determination of lindane in mushrooms.
J. agric. Food Chem., 1955, **3**: 848-9, bibl. 5.

Preliminary sulphonation of a methylene chloride mushroom extract will remove substances interfering with colorimetric determination of lindane in mushrooms.—U.S.D.A., Beltsville, Md.

Okra.

641. Tandon, S. L.
Colchicine treatment of *Abelmoschus esculentus* (L.) Moench.
Sci. and Cult., 1955, **21**: 39-40, illus.

Seedlings raised from colchicine-treated seed had larger cotyledons, and the first 5 leaves were smaller and thicker, with an irregular margin, than those of control plants. There were larger and fewer stomata, and the plants grew more slowly and flowered later than the controls. Pollen grain size was increased, but there was about 25% sterility. The average number of fruits per plant was about the same in treated and untreated plants, but the size was variable and the average weight less in treated plants than in the controls. The number of seeds per fruit from treated plants was low, although there was a slight increase in seed size.—Dep. Botany, Univ. Delhi.

Onions and related crops.

(*See also* 43, 46, 732q, z, 733a, b.)

642. Ministry of Agriculture, London.
Onions and related crops.
Bull. Minist. Agric. Lond. **69**, 4th edition, 1955, pp. 30, illus., 2s.

The chief differences between this and the previous edition are that sections have been inserted on mechanized planting and harvesting and on weed control with sulphuric acid sprays.

643. Berný, M., and Jiránek, J.
Šlechtění rané mrazuvždorné cibule seté. **(Breeding early frost resistant onions.)** [Russian summary 1 p.]
Sborn. čsl. Akad. zeměd. Věd. Rostl. Výroba,* 1955, **28**: 101-16, bibl. 15, illus.

---

* Formerly *Sborn čsl. Akad. Zeměd. Věd., Ser. A.*

* Formerly *Sborn. čsl. Akad. zeměd. Věd, Ser. A.*

By selection of existing varieties and by inter-specific and inter-varietal crossing it has been found possible to develop onions capable of successfully over-wintering in Czechoslovakia. These onions, sown about August 20 and attaining a height of 12-15 cm. before the onset of frosts, withstood a black frost at −30° C., suffering only slight frost scorch. They produced crops as heavy as, and considerably earlier than, sets planted in the spring, at about a tenth of the cost of the latter.

644. STRYDOM, E.
The production of pickling onions.
Fmg. S. Afr., 1955, **30**: 353-4, 366.

European pickling varieties of onion have failed in South Africa owing to their long day requirements. Of suitable Transvaal varieties tested only Early Cape Flat was suitable as a pickling variety. By sowing in mid-September, it was found possible to produce onions of the desired pickling size (¾-1 inch diameter) within about 3½ months.—Hort. Res. Stat., Pretoria.

645. ABE, S., KATSUMATA, H., AND NAGAYOSHI, H.
Studies on the photoperiodic requirements for bulb formation in Japanese varieties of onion, with special reference to their ecological differentiation. [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1955, **24**: 6-16, bibl. 19, illus.

The minimum day-length requirement for bulb formation in Japanese onion varieties varied from 11·5 to 4·25 hours. There was a close relationship between time of bulbing and minimum day-length requirement, in that early-bulbing strains required shorter photoperiods than late-bulbing strains. There was a tendency for regional adaptability of onion varieties in Japan to be determined by photoperiod. Bulb formation did not start under insufficient daylength, and thickening of the bulb tended to be inhibited in excessive day-length owing to the rapid rate of maturation. Varieties are best adapted to regions where minimum temperature and photoperiodic conditions for bulbing occur together.

646. JUNGES, W., AND ERNST, E.
Technische Jarowisation von Steckzwiebeln einer normalerweise im dritten Jahr blühenden Küchenzwiebelsorte (*Allium cepa* L.c. "Dresdner Plattrunde") mit niederen Temperaturen. **(Low temperature vernalization of bulbs of the onion variety "Dresdner Plattrunde", normally flowering in its third year.)**
Arch. Gartenb., 1955, **3**: 84-94, bibl. 9, illus.

Year-old bulbs of "Dresdner Plattrunde" were vernalized at 3° C. for periods of up to 60 days before planting out. The yield per unit area was somewhat lower after vernalization than from untreated bulbs, but there was a high percentage of bigger bulbs. There was an increase in the number of concave-based bulbs with increased length of vernalization. Flowering was suppressed in vernalized bulbs.—Inst. Gartenb., Dresden-Pillnitz.

647. KURATA, H.
Studies on bulb division in onion (*Allium cepa* L.). I. On the differentiation and development of division buds. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 184-93, bibl. 14, illus.

An illustrated account is given of an anatomical study on the differentiation of division primordia and the development of division buds in the onion.

648. RADHAKRISHNAN, T. V.
Pungency relations of *Allium cepa* (onions) and *Allium sativum* (garlic).
Madras agric. J., 1955, **42**: 33-4, bibl. 1.

The volatile sulphur contents of onion, estimated as mg. per 500 g. fresh material, were 57·67, 65·82 and 49·44 for the whole bulb, the inner and the outer scales respectively, and of garlic 55·68, 40·86 and 66·98 respectively.

649. GUROV, M., AND ČERVJAKOV, P.
Cold-warm method of onion storage. [Russian.]
Kolhoz. Proizv., 1955, **15**(9): 25.

Onion sets stored from 1 November for 1½ months at 20 to 30° C., then at 1 to −4° C., and finally from early April for one month at 32° C. remained healthier, produced higher yields and bolted less than those stored by the usual method.

650. KROTOVA, O. A., AND MALENKINA, I. A.
Improving the storage of onions by heating. [Russian.]
Sad i Ogorod, 1955, No. 9, pp. 18-20, illus.

Heat treatment of onions at 35-40° C. for 6-10 hours gave control of neck rot, *Botrytis allii*, and prevented sprouting in storage.

651. GONZALEZ KEPFER, B. R.
Ensayo exploratorio para impedir el nacimiento de los brotes en las cebollas almacenadas. **(Preliminary experiment on the control of sprouting in stored onions.)**
Suelo Tico, 1955, **8**: 18-25, illus.

In experiments in Costa Rica maleic hydrazide at 2,000, 2,500 and 3,000 p.p.m. was sprayed on mature Canaria Amarilla onions shortly before harvesting. The treated onions showed no sprouting after 6 months whereas all the controls had sprouted within 3 months. The best time of application is considered to be 1-2 weeks before harvesting when the onions are mature and the stems, though still green, have begun to droop.

652. LORENZ, O. A., BISHOP, J. C., AND WRIGHT, D. N.
Liquid, dry, and gaseous fertilizers for onions on sandy loam soils.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 296-306, bibl. 13.

In the nitrogen tests best yields resulted from ammonium sulphate placed 4 in. deep under the plant row; nitric acid, aqua ammonia, urea, calcium nitrate, and ammonium sulphate applied in the irrigation water gave much lower yields. Nitric acid placed in the bed gave lower yields than placed ammonium sulphate. Aqua ammonia placed in the bed under the row resulted in low yields and created severe plant toxicity. The toxicity was lessened by placing the aqua ammonia further away from the plant, using split application, and delaying application until the crop was established. Liquid phosphoric acid gave much lower yields when applied in the irrigation water than when placed under the row. When injected in the bed either under the row or in the shoulder of the bed, liquid phosphoric acid and treble superphosphate produced equal yields. Soil samples from beds receiving ammonium sulphate and aqua ammonia showed somewhat greater initial movement of ammonia from aqua ammonia. This may account in part at least for the greater toxicity observed from the use of this material. [From authors' summary.]—Univ. Calif., Davis.

653. Bradley, G. A.
Studies on the irrigation of potatoes, onions and snap beans: I. The effects of the irrigation of several vegetable crops at different levels of available soil moisture. II. A study of the relationship between soil moisture and nitrogen levels, plant development and tuber set of the potato *Solanum tuberosum.*
Diss. Abstr., 1955, **15**: 925-6, being *Publ.* 11987 of 165 pp.

Potatoes, onions and snap beans were grown under field conditions during 3 seasons, and were irrigated at different levels of available soil moisture ranging from 50% downward. Snap beans were also grown in the greenhouse and watered when the soil moisture reached levels below 75%. There was a direct relationship between onion yield and available moisture at the time of irrigation, which was due almost entirely to increased bulb size. There was a linear relationship between growth of snap beans and available water, under both field and greenhouse conditions.

654. Page, O. T.
Botrytis leaf spot on onions and its control.
Canad. J. agric. Sci., 1955, **35**: 358-65, bibl. 13.

The small sclerotial neck-rot fungus, *Botrytis squamosa* Walker, was isolated from the margins of discrete, greyish-white depressed spots on the green leaves of bulbing onions (*Allium cepa* L.) grown on the Bradford Marsh, Ontario. In greenhouse pathogenicity trials there was no evidence of leaf spotting when seedling onions or maturing onions were inoculated with *B. squamosa* or with several other species of *Botrytis*. However, symptoms similar to those observed in the field were induced on the green leaves of Yellow Globe onion plants when they were inoculated with *B. squamosa* and incubated in the laboratory under controlled conditions of light and temperature. Significant increases in onion yields were obtained by the use of Manzate, Parzate (zineb), Vancide F-995W, or Orthocide 50W foliar sprays; DDT was included in all sprays to control thrips. These fungicides were demonstrated to be effective in controlling not only *Borytis* leaf spot, but also downy mildew (*Peronospora destructor* (Berk.) Casp.). [Author's abstract.]—Ontario agric. Coll., Guelph.

655. Bremer, H.
"Schmutzflecken" der weissen Zwiebeln. **(Smudge of white onions.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, **7**: 140-1, bibl. 5, illus.

In the wet summer of 1954 onion smudge (*Colletotrichum circinans*) caused heavy losses in the Bonn area. The symptoms are described and the literature on the disease is reviewed. So far, no control measure has been developed.

656. Doepel, R. F., and Hardie, M.
Downy mildew of onions.
J. Agric. W. Aust., 1955, **4**: 313-18, illus.

Symptoms of downy mildew of onions, caused by *Peronospora destructor*, are described. In fungicidal trials, zineb was the only spray to result in onion yields significantly higher than from the control. The use of spreaders resulted in satisfactory leaf coverage.

657. Jørgensen, J.
Løgfluen. *Hylemyia antiqua*, Meig. Resultater af nogle biologiske undersøgelser og bekaempelsesforsøg. **(The onion fly. Results of studies on biology and control.)**
[English summary, pp. 4.]
Tidsskr. Planteavl, 1955, **59**: 252-79. bibl. 37.

Data are presented on six years' experiments on onion fly control by several methods (seed treatment, bulb treatment before planting and soil treatment) with several chemicals (calomel, lindane, DDT and chlordane). With all methods of control chlordane proved the most successful insecticide, but the results of bulb treatment are confined to a single trial. In 1953 and 1954 chlordane applied as a seed dressing reduced the percentage of plants injured by the pest from 82 and 97 respectively to 2. There was no phytotoxic effect when the dosage was limited to 125 g. active substance per 1 kg. seed. In 1954 soil treatment of onions and shallots with chlordane (5 g. of a 10% compound per 1 m. of row) reduced the percentage of injured plants from 36 and 13·5 to 5 and 0·7 respectively. In the case of soil application early treatment is required as the attack begins to develop in the beginning of June. The biology of the pest is discussed in some detail.

658. Castronovo, A., and others.
Influencia de la distancia de trasplante sobre el rendimiento del puerro (***Allium porrum*** L.). **(Effect of spacing on leek yields.)**
Idia, 1955, No. 85, pp. 22-4.

Giant Carentan leeks were planted 5, 10, 15 and 20 cm. apart in rows 40 cm. apart. The closest spacing gave the highest yield per ha., namely, 81,500 kg., and the widest the highest yield per plant, namely, 3·53 kg.—Inst. Fitotec., Castelar.

659. Freeman, T. E., and Tims, E. C.
Antibiosis in relation to pink root of shallots.
Phytopathology, 1955, **45**: 440-2, bibl. 6, illus.

Studies suggested that antagonistic actinomycetes were a factor limiting development of the pink root fungus, *Pyrenochaeta terrestris*, in a non-infested soil adjacent to a heavily infested soil.—La St. Univ., Baton Rouge. [See also *H.A.*, 25: 612.]

Rhubarb.

(*See also* 44, 551.)

660. Brown, D. R., and Shewfelt, A. L.
Effect of variety and rainfall on the acid content of rhubarb.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 17.

Six varieties of rhubarb were harvested at 6 weekly intervals from 21 May to 25 June during the years 1951-53. Analyses were made of moisture and total acid content. Sutton's Seedless was consistently highest in acid content (1·57–2·23%). Valentine had an acid content of 1·39–1·73% while the other 4 varieties, Canada Red, Early Sunrise, Plum Hutt and Ruby, had acid contents of 1·26–1·71%. The mean acid content of all varieties for all harvest dates was 1·78% in 1951, 1·60% in 1952 and 1·32% in 1953. The marked differences in acid content from one year to another are attributed mainly to differences in rainfall during the period of harvest (1·75, 4·50 and 7·50 in. respectively in the 3 years). With normal precipitation there was a tendency towards increased acid content with advancing date of harvest, but high rainfall nullified this trend and reduced acid values. No consistent relationship was observed between rainfall and moisture content of rhubarb.

Root crops.

(*See also* 40, 41, 55, 58, 80, 732h, j.)

661. Brown, J. W., and Wadleigh, C. H.
Influence of sodium bicarbonate on the growth and chlorosis of garden beets.
Bot. Gaz., 1955, **116**: 201-9, bibl. 15.

The response of beet plants to additions of 0, 8, 16, and 32 meq/l. $NaHCO_3$ to a base nutrient solution was compared with the response of bean plants grown on substrates of the same composition in a previous experiment [see *H.A.*, 23: 747]. The growth of beets was less influenced by the level of the bicarbonate ion in the substrate than was the growth of beans. The bicarbonate treatments effected large accumulations of sodium and oxalate in beet leaves. Comparison of cation accumulation in bean and beet leaves showed that treatment and chlorosis were not correlated with any particular cation or with the K/Ca ratio in either species, but rather with monovalent cations or the Na+K/Ca+Mg ratio. The increased accumulation of organic acids in bicarbonate-induced chlorosis appears to depend on the maintenance of ionic balance. [Authors' summary.]—U.S. Dep. Agric., Riverside, California.

662. Bobrov, R. A.
Cork formation in table beet leaves (*Beta vulgaris*) in response to smog.
Proc. 3rd nat. Air Pollution Symposium, Pasadena, 1955, pp. 199-206, illus.

When subjected to smog conditions table beet forms an abnormal cork-like layer, the cicatrice, on the lower leaf surface. The anatomical changes resulting in its formation are described.—Los Angeles County Air Pollution Control District, Calif.

663. Anderson, D. R., and Spikes, J. D.
Some effects of 2537 Å ultraviolet radiation on rhubarb chard.
Proc. Utah Acad. Sci., 1953-1954, **31**: 112-14, bibl. 4.

Ultraviolet radiation was applied to plants of rhubarb chard (*Beta vulgaris*) [similar to Swiss chard except for the red colour of its leaves] at an intensity of approximately 2,000 microwatts/cm². The immediate effects on leaves were decolorization of anthocyanin pigments in petioles and mid-ribs and loss of the waxy bloom. When only a petiole segment was irradiated, the tissue became brown and necrotic, and finally atrophied. Whole leaves which were irradiated became chlorotic, but this effect could be modified by post-irradiation treatment. A further effect of irradiation was inhibition of the photochemical activity of chloroplasts isolated from irradiated leaves.

664. Anon.
Zaadhoeveelheid bij de teelt van wortelen onder glas. **(Seed quantities for carrot growing under glass.)**
Meded. Proefstat. Groent. Fruit. Glas, Naaldwijk, October 1955, p. 3.

The approximate amount of seed (germination 90%) needed for carrot growing in frames and heated or cold houses is tabulated. Soil type, use of herbicide and thinning are also taken into account.

665. Wagner, M., and Beneš, V.
Vliv různého sponu na výnos kořenů mrkve. **(The influence of spacing on the yield of carrots.)** [Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba,* 1955, **28**: 117-24, bibl. 4.

In 1951 a spacing of 25 × 5 cm. gave the highest yield of 7 carrot varieties tested in Olomouc. In 1952 a spacing of 30 × 5 cm. was found to be the best, and it was noted that the highest yield and best quality were associated with the greatest distance between the rows and smallest distance within the row.

666. Plant, W.
The growth of carrots on an acid soil.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, [1955], pp. 203-4, bibl. 2, illus.

Carrots were grown in a highly acid soil treated with gypsum, lime or sodium molybdate applied as a soil dressing or foliage spray. Virtually no yield was obtained from any of the plots except those treated with lime, from which a yield of 24 tons of roots per acre was obtained. All plots except those treated with lime showed symptoms resembling Al and Mn toxicity. There was no obvious correlation between concentration of Mo in the leaf and yield of roots. Levels of Mn, however, were well correlated with yield, the levels in the lime treatments being significantly lower than those in any other treatment. It would therefore appear that Mo deficiency is not a factor limiting the growth of carrots in acid soils, and that good crops can be obtained if Al and Mn toxicities are corrected by liming to pH 7·0.

---

* Formerly *Sborn. čsl. Akad. zeměd. Věd, Ser. A.*

667. Ehlers, M.
Saatgutbehandlung gegen die Möhrenfliege.
(Seed treatment for carrot fly control.)
Z. PflKrankh., 1955, **62**:617-19, bibl. 5.

Pelleting of carrot seed with an 80% lindane preparation at the rate of 200 g/kg. gave excellent control of carrot fly without affecting germination or flavour. Dieldrin seemed equally promising, but DDT proved ineffective when used for pelleting.

668. Statens Forsøgsvirksomhed i Plantekultur.
Gulerodsfluen (*Psila rosae* F.). **(The carrot fly.)**
Tidsskr. Planteavl, 1955, **59**: 365-8.

The following measures are recommended for carrot fly control: (1) For early carrots, seed pelleting with lindane (2·5%; 500 g. per kg. of seed), chlordane (50%; 250 g./kg.) or possibly aldrin (12·5%; 250 g./kg.). This treatment, however, affected germination in some of the trials. (2) For late carrots, either soil treatment before sowing with lindane or chlordane, or watering with parathion solutions at least 6 times in the course of the summer. Flavour was not affected by any of the treatments the results of which are fully tabulated.

669. MacLagan, D. S.
Ecology and control of carrot fly.
Res. Bull. W. Scot. agric. Coll. **12**, 1955, pp. 32, bibl. 14, illus.

The main recommendations for the control of *Psila rosae* are: (1) A seed dressing of gamma BHC dust at 3-4% by weight of seed, the seed preferably having been treated beforehand with 1 teaspoonful of light mineral oil per lb. to improve adhesion, followed, in years of heavy infestation, by one application of 10% DDT dust in early August. (2) Alternatively, 2-3 applications of 10% dust or 1·0% emulsion spray of DDT in late May and early and late August. Other recommendations concern date of clamping, clamp treatment with naphthalene, use of creosoted sawdust in gardens, open cropping and delayed sowing.

670. Shaw, M. W., and McDonald, I.
Comparison of aldrin and BHC for the control of carrot fly.
Plant Path., 1955, **4**: 11-13, bibl. 4.

Early Market carrots were sprayed with crude and γ-BHC and aldrin, and the percentage damage by carrot fly (*Psila rosae*) on lifted roots was assessed. The BHC treatments, which were highly effective, gave better control of first generation attack than aldrin. A spray of γ-BHC applied simultaneously with weed oil was the most effective of the BHC treatments for practical use.

671. Junges, W.
Zur Frage des Auspflanztermines der Erdmandel (*Cyperus esculentus* L.) und ihrer technischen Jarowisation bei niederen Temperaturen. **(The time for planting out chufa (*Cyperus esculentus*) and its vernalization at low temperatures.)**
Arch. Gartenb., 1955, **3**: 17-21, bibl. 6.

Roots of *Cyperus esculentus* were vernalized for 14 days at 3° C., after 24 hours in tap water at room temperature. Final yields from these roots averaged 18% more than from controls. Comparisons of 3 planting dates (at monthly intervals from mid-March to mid-May) showed that yields from vernalized roots increased slightly with each later planting date; yields of untreated roots decreased at later dates. Root treatment for 10 days at 30° C. or for 24 hours in tap water at room temperature did not increase yields. Preliminary results from 1954 experiments have shown that in the period from 10 days before to 30 days after planting out, the most favourable temperature for root development was 10-11° C. April 15-20 was the most suitable time for planting in central Germany. Inst. Gartenb., Dresden-Pillnitz.

672. Mantari Camargo, C.
El mejoramiento del cultivo de las ocas (*Oxalis tuberosa* Mol.). **(Improvement in the culture of *Oxalis tuberosa*.)**
Divulg. Inf. Dir. gen. Agric. Peru **3**, 1955, pp. 16, bibl. 6, illus.

Information is given on culture in the Lake Titicaca basin, pests, ecology, method of drying and chemical composition of the tubers, varieties, varietal trials and yields.

673. Tomar, M. S., and Khanna, A. N.
Colchicine-induced polyploidy in radish.
Indian. J. Hort., 1955, **12**: 6-14, bibl. 8, illus.

Radish seeds in which germination had been initiated were treated with several concentrations of colchicine for various periods of time from 12 to 60 hours. The higher concentrations and longer treatments decreased germination. Treated plants had broader and thicker leaves than control plants. Differences in number and size of stomata were highly significant. Treated plants flowered for significantly longer periods than untreated plants, and showed various floral abnormalities. Pollen grains were significantly larger in treated plants, but more sterility was observed than in control plants. Pods were shorter and fatter after treatment and, although the number of seeds per pod was lower, seeds were larger than those of untreated plants.—Gov. Agric. Coll., Kanpur.

674. Reinhold, J.
Kali und Licht in ihrer Wechselwirkung auf den Radiesertrag. **(The reciprocal effect of potash and light on radish yields.)**
Arch. Gartenb., 1955, **3**: 48-64, bibl. 11, illus.

A forcing variety of radish was grown in pot experiments in spring under glass, in summer in the open, and in autumn in frames. Increasing amounts of N, P_2O_5 and K_2O were given. Yields from the autumn-grown radishes were lower than from those grown in spring or summer. In general, the lower doses of N promoted root development and the higher doses resulted in increased leaf growth. A similar but smaller effect was observed with P_2O_5. Increased K_2O applications gave increased root growth. K_2O was about 60% less efficient under shade (25% light) than in full daylight. Variation of daylengths showed that under light deficient (short day) conditions more potash was required than under long day conditions.—Inst. Gartenb., Grossbeeren Dtsch. Akad. Landw., Berlin.

675. McIlrath, W. J., Presley, H., and Palser, B. F.
Boron nutrition and carbohydrate metabolism of turnip and tomato plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxiii.

Turnips and tomato plants were grown in sand culture and supplied with adequate or deficient amounts of boron; they were also divided into series receiving (1) no further treatment, (2) sucrose as an aqueous spray, or (3) a spray of a sucrose-boron mixture. In general, plants grown in B-deficiency and sprayed with sucrose alone resembled B-deficient plants in growth and carbohydrate composition. Plants grown under B-deficient conditions, but supplied with the sucrose boron mixture, resembled plants receiving adequate B from the substrate.—Dep. Botany, Univ. Chicago.

676. Choudhri, R. S., and Bhatnagar, V. B.
Effect of maleic hydrazide on the keeping quality of turnips (*Brassica rapa* L.)
Indian J. Hort., 1955, **12**(1): 1-5, bibl. 13, illus.

Three concentrations (0·05, 0·1 and 0·2%) of maleic hydrazide were applied to 6-week-old turnip plants. At 3-months-old the roots of untreated plants were discoloured, woody and tough, while those of sprayed plants were crisp, tender and white. The optimum effect was obtained with 0·1% maleic hydrazide. Treated plants had fewer mature leaves than the controls. Both fresh and dry root weights were heaviest at 0·1% maleic hydrazide.—Coll. Agric., Banaras Hindu Univ.

Salad crops.

(*See also* 733d, e, 791.)

677. Bogorad, L., and McIlrath, W. J.
Indirect photoperiodic effects on lettuce seed germination.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xx.

Germination of lettuce seeds was inhibited when the seeds were implanted in petioles of *Xanthium* plants maintained in long photoperiods. The inhibition occurred regardless of whether the petiole and imbedded seeds were enclosed in a light-excluding or a transparent wrapper. The site of the perceptive reaction appeared to be in the leaf blades.—Dep. Botany, Univ. of Chicago.

678. Zink, F. W.
Studies with pelleted lettuce seed.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 335-41 bibl. 14.

The addition of thiourea, vermiculite, krilium or terramycin to the coating clay of pelleted lettuce seed did not improve the germination or rate of emergence. At temperatures of 72° F. and higher there was a significant reduction in the germination of pelleted seed compared with that of non-pelleted seed. In field studies the use of pelleted seed resulted in a significant reduction in percentage and rate of emergence. The use of pelleted seed did not affect the spacing between plants after thinning but it reduced the number of doubles left after thinning. The time required for thinning was significantly less with pelleted than with non-pelleted seed. In 5 small trials the use of pelleted seed did not result in yield increases but in 3 large trials it did increase yields.—Univ. Calif., Davis.

679. Rappaport, L., and Wittwer, S. H.
Vernalization studies with lettuce.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxi-xxii.

In Great Lakes lettuce, leaf number and days to appearance of flower primordia and to anthesis of first flower were used as indices of flowering. Seedstalk development and flowering in plants from vernalized seed were hastened only if the plants were exposed to night temperatures of 65° F. or higher. At similar high temperatures unvernalized plants initially formed heads and only produced flowering seedstalks much later. In plants continuously exposed to high temperatures flowering was earlier than in those exposed to alternating low (50° F.) and high (70° F.) temperatures. The minimum night temperature after vernalization at which flowering occurred was reduced to 60° F. under long-day conditions. Lettuce seeds soaked for 6-12 hours and then dried, and seedlings beyond the 2-leaf stage could not be effectively vernalized. A minimum of 13 days at 40° F. was required for vernalization.—Dep. Hortic., Michigan State Univ., E. Lansing.

680. van Soest, W.
De teelt van sla in het winterhalfjaar. **(Winter lettuce growing.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1955, **18**: 753-60, illus.

The introduction of the varieties Regina, Proeftuin's Blackpool and Interrex has offered improved possibilities of producing lettuce in the late autumn, winter and early spring months in Holland.

681. Goodall, D. W., Grant Lipp, A. E., and Slater, W. G.
Nutrient interactions and deficiency diagnosis in the lettuce. I. Nutritional interaction and growth.
Aust. J. biol. Sci., 1955, **8**: 301-29, bibl. 28.

A sand-culture experiment with lettuces is described, having as its principal purpose the study of the relationship between the potential responses of plants to applications of N, P, K fertilizers and the composition of their foliage. Plants were supplied initially with five levels of these nutrients in all combinations, samples of plant material were taken for analysis at various stages of development, and at 44 days from sowing additional quantities of nutrients were supplied to some of the cultures in order that their response potentialities might be determined. The most marked effects on growth were those of P supply, which resulted in increased dry weight throughout the range tested. N supply gave an optimum-type curve, with a tendency for the optimum level to shift upwards with increasing P supply. The highest N supply level had a clearly adverse effect on growth. For K too there is a suggestion of an optimum-type curve, with an optimum shifting in accordance with P supply, but the plants were less sensitive to very considerable (30-fold) changes in K supply than in the case of either of the other nutrients. Within the sub-optimal range the general effect of increasing the supply of one nutrient was to increase the proportional responses to the others. Calculation of relative growth rates indicated that the nutritional effects were spread through the growth period of the plants and not concentrated at any one stage of development. The effects of nutrient applications at 44 days were in general conformity with the effects of initial applications. Plants whose initial treatment placed them in the sub-optimal range for a given nutrient, as inducated by the results from varying initial treatments, also responded, often very markedly, to a further application of this nutrient at 44 days. [From authors' summary.]—Bot. School, Univ. Melbourne.

682. Childs, W. H.
Cover your head lettuce.
A.R.W. Va agric. Exp. Stat. 1954-1955, issued as *Science Serves your Farm, Bull.* **369**, Part 4, 1955, pp. 6, 8, illus.

Rolls of parchment paper supported on half hoops of wire were used to protect early lettuces from cold injury in early spring. The paper cover adequately protected lettuces from low temperatures occurring in March and April. Harvesting of protected early-planted lettuce started at least a week before that of unprotected plants.

683. Napier, C. L.
Damage from watering of frosted crops to prevent injury.
N.Z.J. Agric., 1955, **91**: 142, illus.

In an unheated glasshouse, with 9 degrees of frost, a plot of lettuces was watered $\frac{1}{2}$ hour before the sun shone on them. Subsequently almost every lettuce was affected by burn.

684. Hannon, C. I.
Lettuce root rot studies.
Diss. Abstr., 1955, **15**: 1159, being *Publ.* 12368 of 104 pp.

A root rot has recently caused serious losses in muck-grown lettuce crops; the symptoms are described. Isolates of *Pythium* did not cause field symptoms in greenhouse-inoculated plants. In the field the disease appeared to be favoured by low temperatures and high soil moisture; lettuce planted in late June and July was subject to fewer losses than those planted in early spring. Several varieties of cos and butterhead lettuce were highly resistant or field immune to the disease.—Cornell Univ. [See also *H.A.*, 25: 2938.]

685. Stewart, J. K.
Arizona spring lettuce refrigeration requirements during marketing periods.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 387-92, bibl. 5.

On the basis of experiments described it is recommended that head lettuce grown in the western U.S.A. and intended for eastern markets (10-15 days' transit period) should be shipped at a transit temperature not exceeding 37° F.—Agric. Exp. Stat., Tucson, Arizona.

686. Lecrenier, A., and others.
Contribution à l'étude du développement morphologique de la chicorée-witloof. **(Study of the morphological development of Witloof chicory.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Weekly observations have been made for 2 years on the development of chicory and the results are here recorded and discussed. Forcing at a controlled temperature, 18° to 24° C., has also been under observation. Investigation is desirable on optimum conditions for rest prior to forcing. Present investigations on the analysis of specimens kept in a dry condition will reveal the process of storage and utilization of reserve materials in the root.—Stat. Amél. Plantes, Gembloux.

Spinach.

687. Janick, J., and Stevenson, E. C.
Environmental influences on sex expression in monoecious lines of spinach.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 416-22, bibl. 5.

The use of monoecious lines of spinach in the production of hybrid seed made it desirable to study the effect of environmental factors on sex expression. Results of experiments showed that temperature and daylength both affected the proportion of pistillate to staminate flowers in monoecious and pistillate plants. There was no evidence that staminate plants were affected. A shift towards maleness in monoecious and some pistillate plants was brought about by temperatures of 80° F. At high temperatures (80° F.) there was an inverse relationship between maleness and length of day in monoecious spinach, indicating a temperature-daylength interaction.—Agric. Exp. Stat., Lafayette, Ind.

688. Pasture, E.
Bemesting van spinazie. **(Spinach manuring.)**
Cult. Hand., 1955, **21**: 381-2.

The manuring of spinach and its importance are discussed. Some experiments in Belgium have shown that yields on Mg-deficient soils are about one-tenth of those on soils adequately manured. In studies on minor elements spinach reacted quickly to Mn deficiency by chlorosis and finally necrosis.

689. Geissler, T.
Die gemüsebauliche Nutzung der Spreewald-Klockböden. **(The use in vegetable growing of Spreewald "Klock" soils.)**
Dtsch. Gartenb., 1955, **2**: 270-2, illus.

"Klock" soils are very heavy, clayey, alluvial soils, difficult to work and with a low nutrient content. A series of pot experiments with spinach have shown that good yields can be obtained with them and the best results were obtained by the following treatments: mixing the soil with equal parts of sand; applying calcium carbonate at 10 dz./ha., followed by 300-400 dz./ha. of farmyard manure or straw compost; applying mineral fertilizers at the rate of 140-170 kg. P_2O_5/ha., 170-220 kg. K_2O/ha. and 150-200 kg. N/ha., in 3 or 4 doses.—Inst. Gartenb. Grossbeeren, Dtsch. Akad. Landw., Berlin. [See also Abstr. 578.]

690. Poapst, P. A., Jones, A. H., and Phillips, W. R.
Problems associated with the pre-packaging of spinach (1952).
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1954*, p. 3.

Spinach was packed within 2 hours of cutting in polyethylene bags, at 6 oz. per bag, and stored at 32° F. for 1 week, after which it was held at room temperature for 18 hours. All bagged material had bacterial counts many times higher than the non-bagged controls, those in perforated bags being the worst. Control material wilted within 24 hours while bagged material remained firm until the end of the test. Quality decline, colour loss and odour development was most severe in the perforated bags. Rapid cooling by immersion in ice water had a beneficial effect.—Centr. exp. Fm, and Sci. Serv., Ottawa.

Tomatoes, eggplants and capsicums.

(*See also* 45, 47, 53, 59, 89, 117r, 675, 732d, g, i, l, o, r, s, y, 751, 786, 1202.)

691. HOCKEY, K. C.
Some facts and some problems associated with the production of tomatoes under glass in New Zealand.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Owing to a mild climate glasshouses in N.Z. can only be used economically for about 7 months each year. The chief physiological problem is cloud. Pathological problems discussed are *Cladosporium fulvum* and *Botrytis cinerea.* Diseases are listed. Pests are readily controlled.—Massey agric. Coll.

692. CRNKO, J.
Estudios comparativos sobre variedades de tomate. **(Tomato varietal trials.)**
Idia, 1954, No. 83, pp. 7-25, bibl. 25, illus.

Information is given on the botanical and agronomic characters of 53 tomato varieties, mostly of U.S. origin, tested at La Consulta experimental substation in Mendoza province in 1948-54, and on the composition of the fruit of the 20 most important.

693. VIŠNEVSKIĬ, S. I.
New tomato varieties for the canning industry. [Russian.]
Sad i Ogorod, 1955, No. 7, pp. 16-18.

Among the new varieties mentioned Ahtubinskiĭ 85 is distinguished by its earliness, high yield, large fruit and high dry matter content; its spreading growth habit, however, makes mechanical inter-row cultivation difficult. Another useful variety, Štambovyĭ 5, of compact growth and high dry matter content, is prolific but has smaller fruits.

694. TARUTANI, T.
Studies on tomato juice manufacture. (1) Suitable tomato varieties. [Japanese, with English summary ¼ p.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 199-204, bibl. 27.

The characteristics required for the manufacture of high-quality juice are considered to be a deep red colour, a citric acid content of 0·35% or more and a sugar/acid ratio of 6·5 or more. A list is given of some U.S. and Japanese varieties found suitable.

695. RICHARDS, R. R.
A new tomato "Victor".
Tasm. J. Agric., 1955, **26**: 287-9, illus.

Trials have indicated that Victor is a promising early variety for irrigated early districts in Tasmania. It may also be of value in high altitude areas where ripening is a problem.

696. CHOUDHURY, B.
Inducing polploidy in *Lycopersicon esculentum* Mill.
Indian J. Hort., 1955, **12**(1): 15-18, bibl. 6, illus.

Methods of colchicine application were studied with the tomato variety Potentate. The best results with seeds were obtained by pre-soaking for 24 hours and then immersing in 0·2% colchicine solution for 6-8 days, or in a 0·4% solution for 4-6 days. Treatment of the growing tips of seedlings was successful with 0·2% colchicine emulsion, but not with 0·2% water solution of colchicine, the most favourable period of treatment being 6-8 days. In treating root tips, 0·4% concentration gave better results than 0·2% and treatment for 4-6 days was the best.—Hort. Res. Stat., Sabour, Bhagalpur.

697. WALKOF, C.
An application of the double backcross breeding method to tomato improvement.
From summary *Pap. 14th int. hort. Congr.* 1955, Scheveningen, *see note p. 4.*

Breeding large fruited, early ripening tomatoes is important to gardens in the short season of the North American Great Plains region. The combination of the two qualities named above is not easy. The possibility of combining the genes necessary by the double backcross method is explored in this study.—Exp. Stat., Morden, Manitoba. [See also *H.A.*, 25: 4066m.]

698. LEHMANN, C. O.
Das morphologische System der Kulturtomaten (*Lycopersicon esculentum* Miller). **(The morphological system of cultivated tomatoes.)**
Züchter, 1955, Sonderheft 3, pp. 64, bibl. 108, illus., D.M. 15 (for subscribers to *Züchter* D.M. 12).

Following an introductory chapter morphological descriptions are given of the following features of *Lycopersicon esculentum*: cotyledon, root system, hairs, stem, leaf, inflorescence, flower, fruit and seed. As regards the origin of the species, the author believes that it derives from forms of *L. pimpinellifolium.* The morphological system of the subgenus *Lycopersicon* is set out in great detail with identification keys for the subgenus and its two species, *L. pimpinellifolium* and *L. esculentum*, the latter comprising five convarieties subdivided into several groups. Diagnostic descriptions are given of all the varieties grown in the tomato collection of the Institut für Kulturpflanzenforschung, Gatersleben. [See also *Kühn Arch.*, 1954, **68**: 360-1, *H.A.*, 25: 2992r.]

699. COOPER, A. J.
Further observations on the growth of the root and the shoot of the tomato plant.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Variety, Potentate; time of observation, March to July; environment, aeroplane-type glasshouse at Cheshunt. —Exp. Res. Stat., Cheshunt.

700. Calvert, A.
Temperature effects on early growth and development in tomato.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

There are 3 thermophases during which temperature affects the following:—the production of the rogue character, the determination of inflorescence position, and the size of inflorescence or degree of branching. Appropriate temperatures should be determined and adhered to.— John Innes hort. Instn. Hertford.

701. Hillman, W. S.
An investigation of light-injury in tomato plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): viii.

Exposure of actively growing tomato plants to continuous illumination, at constant temperatures of from 30° to 14° C. or lower, resulted in leaf-injury symptoms in patterns characteristic for the temperature used. Daily temperature changes will prevent injury. Sensitivity was highest in plants with 3-7 leaves, declining markedly in older plants. Rooted apical cuttings of older plants were more sensitive than the intact plants. With a basic non-injurious schedule of 16-18 hours light per day, injury was produced by interruptions of the light and dark periods. Although a light-dark schedule of 20-4 hours is non-injurious, 8-4, 11-4 and 14-4 induce injury, which indicates that a critical light period for 4 hours of darkness lies somewhere between 14 and 20 hours.—Calif. Inst. Technology, Pasadena.

702. Ashby, W. C.
The influence of temperature, humidity and light factors on water loss.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.) : xvii.

Methods have been developed for continuous measurement of water loss from groups of 16 tomato seedlings. The influence of temperature and humidity on water loss was studied, and the effect on vapour pressure deficits evaluated. These effects were observed at 2 light periods and 2 light intensities. For a 12-hour period under one set of conditions, water loss was very uniform. Experiments at 4 temperatures, with humidity adjusted to give a vapour pressure deficit of 3 g. per m^3, showed little variation in loss. At one temperature and a series of relative humidities, transpiration per unit leaf surface was almost linear with increasing vapour pressure deficit. Greater transpiration occurred in a 12-hour light period than in a 12-hour dark period, and at 1200 f.c. than at 600 f.c. light intensity.—Dep. Botany, Univ. of Chicago.

703. Gates, C. T.
The response of the young tomato plant to a brief period of water shortage. I. The whole plant and its principal parts.
Aust. J. biol. Sci., 1955, **8**: 196-214, bibl. 22, illus.

The growth response was determined of young tomato plants subjected to wilting treatments of short duration. The experiments were conducted in pots in the glasshouse using Jondaryan loam, and the wilting treatments were at a "moderate" and a "severe" level. Even with the severe treatment, soil water did not fall below the permanent wilting percentage. Both wilting treatments reduced growth during the period of wilting, but growth rates upon re-watering were greater than for the contro plants. There was no indication that this recover effect was complete at the final harvest. Durin wilting, a higher stem weight ratio and a lower lamin weight ratio were developed than in the control, an relative growth rates and net assimilation rates wer depressed in both treatments. After wilting, lamin weight ratios became higher than control, stem weigh ratios became lower, and net assimilation rates an relative growth rates rose above control values. Thes treatment effects may be interpreted as a tendenc towards senescence during wilting and a return to more juvenile condition upon re-watering. It wa concluded that the changes in weight ratios were due t modifications of the normal pattern of translocatio between plant parts. It was also concluded that th changes occurring in response to the water shortag were initiated relatively early in the drying cycle. Th effects of water shortage on the water economy of th plant were also considered. It was found that, whils there was a high efficiency of transpiration durin wilting, the drastic effects of the water shortage o growth made the greater efficiency of doubtful merit After wilting, there was no economy in water usage b plants of either of the wilt treatments. [Author' summary.]—Irrig. Res. Stat., C.S.I.R.O., Griffith N.S.W.

704. Gates, C. T.
The response of the young tomato plant to a brief period of water shortage. II. The individual leaves.
Aust. J. biol. Sci., 1955, **8**: 215-30, bibl. 13.

The dry weight and water contents data are considere for the individual laminae and petioles of the firs eight leaves of tomatoes subjected to a brief period o wilting after they had developed eight easily manipulable leaves. The aim was to obtain a better understanding of the response previously described for the whol plant [see preceding abstract] by studying the growt of organs which were at various stages of developmen when treatments were imposed. It was found that the rise in stem weight ratio and fall in lamina weight ratio during wilting occurred because translocation continued to the stem but was impaired to the uppe laminae. Upon re-watering the normal course o translocation appeared to be readily resumed. Th decreased growth rates of the laminae during wilting and the resurgence of their active growth upon recovery can now be seen to derive principally from the response of the younger laminae and the younger tissues of the more mature laminae. Both the growth data and the water content data of the individual leaves show that it is the younger portions of the total leaves that are important centres for the development of the whole plant response, a response which may be described as a senescent decline in growth during wilting and the development of a physiologically younger condition upon recovery. [Author's summary.]—Irrig. Res. Stat., C.S.I.R.O., Griffith, N.S.W.

705. Dennison, R. A.
Tomato ripening. A discussion of the factors that influence color, flavor, and firmness in tomato fruits.
Market Grs' J., 1955, **84**(9): 6.

Colour in tomato fruits is largely determined by the lycopene-carotene ratio. Chlorophyll breakdown precedes pigment formation at temperatures between 59° and 104° F. (optimum 75° F.). At temperatures above 86° F. fruits develop a yellow colour as lycopene is not produced. At favourable temperatures the peak carotene production is reached within a week, but the maximum amount of lycopene takes 2 weeks to appear. Fruits reaching the mature-green stage during cool weather ripen more slowly at 70° F. than fruits of similar maturity grown in a warm period. Fruits illuminated during ripening have a deeper red colour than those held in the dark. Flavour depends largely on the sugar-acid ratio. In unventilated conditions acid accumulates in the fruit giving it a sour taste. Acidity in fruits decreases as soil moisture increases; high potash dressings tend to increase acidity. Fruits exposed to sunlight have a higher sugar content than shaded fruits. Pectic substances in the fruit are important in determining firmness; fruits with high Ca are firmer than those with less Ca.

706. Brown, G. B.
The ascorbic acid content of tomatoes as related to illumination.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 342-8, bibl. 11.

Experiments showed that fruits from plants grown in direct sunlight contained more ascorbic acid than fruits from shaded plants. Similarly individual fruits receiving direct sunlight were higher in ascorbic acid than fruits shaded by leaves or by artificial cover. Greenhouse tomatoes did not lose much ascorbic acid when shaded for 6 days prior to harvest, but did lose a significant amount when shaded for 9 days. They gained a significant amount when shades were removed only 3 days before harvest. Field-grown tomatoes lost a slight amount of ascorbic acid when shaded for from 1 to 9 days before harvest. Plants changed from shade to sunlight as late as 5 days before harvest showed significantly more ascorbic acid than those shaded for the entire growing period.—Cheyenne hort. Field. Stat., Wyoming.

707. Nettles, V. F., Hall, C. B., and Dennison, R. A.
The influence of light on color development of tomato fruits.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 349-52, bibl. 6.

Mature-green tomatoes exposed in the ripening room to from 10 to 450 F.C. of constant illumination from cool-white fluorescent lights had significantly higher colour values and more total carotenoids than similar fruits ripened in the dark. Using illumination of 50 F.C. during the entire ripening period (8-9 days) resulted in increased colour values and total carotenoids compared with ripening in the dark or exposure for 1 or 2 days only. Exposure for 3-4 days, however, during the early stages of ripening, was just as effective as exposure during the whole ripening period. No differences were found in the carotene content of fruits exposed to light or ripened in the dark.—Fla agric. Exp. Stat., Gainesville.

708. Melvin, E. W.
Factors associated with the respiration of ripening tomato fruits.
Diss. Abstr., 1955, **15**: 665, being *Publ.* 11520 of 47 pp.

The respiratory climacteric of ripening tomato fruits occurred 1 to 5 days after initial carotenoid formation, the average being 2 days. Rate of respiration and height of climacteric were found to be inversely related to fruit size, and the greatest differences in the rate of respiration between individual fruits occurred at the time of the climacteric. Fruits exposed to sunlight during their development had a consistently higher level of respiration and a slightly greater sugar content than had shaded fruits. Bruised fruits respired at a significantly higher rate and had a more pronounced climacteric than unbruised fruits of similar size. With increased respiration of bruised fruits there was an increase in total sugars but the organic acid content was reduced. Fruits of the variety Double-Rich respired more rapidly than those of Stokesdale, but were significantly lower in sugars and total acidity, and significantly higher in Vitamin C content. Changes in the content of carotenoids, sugars, organic acids and ascorbic acid did not parallel the respiratory curve of ripening tomato fruits.—Univ. Ill.

709. Corrales Macedo, A.
Sistema de sembrio y distanciamiento en el cultivo de tomate. (**Method of sowing and spacing in tomato growing.**)
Inf. mens. Estac. exp. agric. La Molina Lima, 1955, **29**(333): 6-12.

Trials in 1954 gave the following results: (1) Direct sowing advanced maturity by 3 weeks and increased yield by 4474 kg. per ha. compared with nursery sowing and subsequent transplanting. (2) Yields were not significantly different by spacings of 0·25, 0·50 and 0·75 m. (3) The above-mentioned sowing methods and spacings had no significant effect on the commercial grade of the fruit. (4) Direct sowing and close spacing favoured pests and diseases.

710. Strydom, E.
Is it necessary to prune tomato plants?
Fmg S. Afr., 1955, **30**: 349-50, 352, illus.

The author warns against pruning tomato plants under South African conditions where excessive sunlight causes sunscald on unprotected fruits. Research at Pretoria has shown that yields from unpruned plants were higher than those from pruned plants (52·12 tons and 42·76 tons per morgen of marketable fruit respectively [=25 or 20 tons per acre]. At the Subtropical Research Station, Nelspruit, pruned plants produced a higher percentage of mis-shapen and cracked fruits than unpruned plants.—Hort. Res. Stat., Pretoria.

711. Cawthron Institute.
Tomato research. Effect of pruning on yield and quality.
A.R. Cawthron Inst., 1954-55, pp. 26-7.

The early removal of laterals from the lower part of the stem reduced yields but improved quality of glasshouse tomatoes.

712. Starostka, R. W., and Clark, K. G.
Greenhouse evaluation and nitrification characteristics of biuret and urea-biuret mixtures.
Agric. Chemic., 1955, **10**(10): 49-50, 103, 105, bibl. 12.

Biuret, a decomposition product of urea, injured ryegrass for a short period after application but later became a useful source of nitrogen. In a glasshouse experiment with other crops, including tomatoes, a 100 lb. per acre application of a 9:1 urea biuret mixture to the soil did not harm the plants. In laboratory tests at 30° C. the rate of nitrification of biuret was substantially lower than that of either urea or ammonium sulphate, but the degree of nitrification of all 3 materials was similar at the end of 15 weeks.—U.S. Dep. Agric., Beltsville, Md.

713. Pattanaik, S., and Lathwell, D. J.
A study of the available phosphorus status of soils by phosphorus-deficient tomato seedlings.
Plant and Soil, 1955, **6**: 305-12, bibl. 8.

Tomato plants were used in greenhouse studies to evaluate the P-fertility status of several New York soils by determining the relationship between the anthocyanin content of the plants and their response to added P. In general, there was an inverse relationship between the anthocyanin content of the leaves and increases in dry weight production, when P only was the limiting factor.—Cornell Univ., Ithaca.

714. Drake, M., and Steckel, J. E.
Solubilization of soil and rock phosphate as related to root cation exchange capacity.
Proc. Soil Sci. Soc. Amer., 1955, **19**: 449-50, bibl. 6.

Several plants, including tomato, were grown to maturity in a soil with low P content, admixed with applied rock phosphate. In general P uptake was increased with increased root exchange capacity.

715. Walker, R. B., Walker, H. M., and Ashworth, P. R.
Calcium-magnesium nutrition with special reference to serpentine soils.
Plant Physiol., 1955, **30**: 214-21, bibl. 18,

Two serpentine soils were reconstituted into a series with percentages of exchangeable Ca between 2·8 and 82, with Mg as a complementary ion; tomato and sunflower were among the crops grown in greenhouse pot and solution cultures. Yields of the crop plants were markedly depressed at exchangeable Ca levels of 20% or less, and there was little or no growth at levels below 10%. At the lower Ca levels, tomato and sunflower had lower percentages of Ca and higher percentages of Mg in the leaf tissue than native species studies. Sunflower in solution culture showed similar reactions to those which occurred in pot culture.—Univ. Washington, Seattle, Wash.

716. Wróblewska, Z.
Wpływ manganu i boru na wartość użytkową pomidorów. **(The effect of manganese and boron on the growth and quality of tomato fruits.)** [English and Russian summaries 8 lines and 1 p. respectively.]
Roczn. Nauk rol., Ser. A, 1954, **70**: 315-25, bibl. 10.

Results of an investigation into the effect of Mn (as $MnSO_4$) and B (as H_3BO_3) on tomato fruits grown under greenhouse, hotbed and field conditions have shown that applications of Mn with or without the boric acid improved yields, reduced the percentage of cracked fruits and increased their ascorbic acid content.

717. Fiskel, J. G. A., and Mourkides, G. A.
A comparison of manganese sources using tomato plants grown on marl, peat and sand soils.
Plant and Soil, 1955, **6**: 313-31, bibl. 12.

Tomato plants were grown in pot studies to estimate the availability of manganous oxide, γ-manganous dioxide, MnEDTA, and manganous sulphate on Mn-deficient and Mn-sufficient soils. Mn deficiency leaf symptoms in the tomato plants were related to the Mn level in the plant and the Fe/Mn ratio. Fe intake and Mn intake showed some evidence of inverse relationships. Manganous sulphate was slightly more available than manganous oxide, which in turn was more available than γ-manganous dioxide or MnEDTA.—Fla agric. Exp. Stat., Gainesville. [See also *H.A.*, 24: 3927.]

718. Crooke, W. M.
Further aspects of the relationship between nickel toxicity and iron supply.
Ann. appl. Biol., 1955, **43**: 465-76, bibl. 13.

Results are reported for oat plants but similar results were obtained with tomatoes. Absorption of Ni increased with increasing pH for a fixed Fe supply. Ni uptake and toxicity symptoms (necrosis and chlorosis) were both reduced when the concentration of Fe in the nutrient solution was high. Absorption of Ni and the intensity of necrosis increased with increase in the Ni: Fe ratio in the nutrient solution. For solutions with the same Ni:Fe ratio, toxicity symptoms increased with increase in the absolute amount of Ni. There was a linear relationship between the degree of necrotic symptoms and the Ni:Fe ratio in the plant. Ni consistently reduced the Fe content of roots and tops. In the absence of Ni, the Fe content of the roots but not of the tops increased with Fe supply. In Ni-toxic plants, the Mg, Ca and P contents of the tops and the K, Ca and P contents of the roots were higher than in healthy plants, but the K content of the tops and Mg content of the roots were lower.—Macaulay Inst. Soil. Res., Craigiebuckler, Aberdeen.

719. Hudson, J. P., and others.
Water-regimes in irrigation research.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

Growing tomatoes, lettuces and other plants in containers in which the water required was only allowed to fluctuate between two pre-determined conditions, namely field capacity and a measureable stage in the drying cycle, the authors found that, whereas tomatoes showed a striking response to different water regimes, lettuce grew equally well under a variety of water regimes. The significance of these findings is discussed. —Dep. Hort., Univ., Nottingham.

720. Bouhelier, R.
L'influence de l'irrigation sur certaines caractéristiques des tomates industrielles. **(Effect of irrigation on certain characteristics of processing tomatoes.)**
Terre maroc., 1955, **29**: 296-9.

Tests on Red Jacket tomatoes at 3 stations in 1952-54 were designed to determine the optimum volume and interval between irrigations for yield of healthy fruit, pulp %, total dry matters and sugars:acids ratio. 350 cu. m. per ha. was found to be the best volume at all stations, 12 days the best interval at Ain Taoudjat and 6 at Marrakech and Fqih ben Salah. Yields of 22-29 tons healthy fruit per ha. were obtained with total dry matter of 6060-6460 kg. per ha.

721. Conover, R. A.
Control of bacterial spot in tomato fields with streptomycin-Terramycin sprays.
Plant Dis. Reptr, 1955, **39**: 611-15, bibl. 3.

Results of two experiments with streptomycin-Terramycin [Agrimycin 100] for control of bacterial spot [*Xanthomonas vesicatoria*] in tomato fields are reported. In one, use of sprays containing 200–20 p.p.m. of the antibiotics resulted in 67% less fruit infection, 12% increase in fruit size, 50% increase in yield of bacterial-spot-free fruit, and 25% increase in total yield, when compared to check plots. Corresponding figures for 100–10 p.p.m. sprays were 28%, 7%, 22%, and 10%. In the second experiment, 200–20 p.p.m. sprays caused 85% and 72% reduction in fruit infection in areas set respectively with healthy and bacterial-spot-infected transplants; healthy transplants sprayed with 100–10 p.p.m. had 74% less infected fruit compared to check plots. A 40% reduction in cracking and scarring of fruit was noted in the second experiment, but size was unaffected. Fruit infection increased markedly when fruit was picked while the vines were wet and decreased sharply when vines were dry. [Author's summary.]—Univ. Fla sub-trop. Exp. Stat., Homestead.

722. Serrano S., L.
Posible inducción de resistencia del tomate al *Phytophthora infestans* (Mont.) de Bary mediante auxonas. **(Possible induction of resistance to tomato late blight by growth substances.)** [English summary 1 p.]
Acta agron. Palmira, 1955, **5**: 117-34, bibl. 23, illus.

Marglobe tomato plants were inoculated with *Phytophthora infestans* at various intervals after dipping the leaves in solutions of IAA, IBA salt, NAA, 2,4-D and 2,4,5-T. The growth substances all conferred resistance to the disease but, with the exception of 2,4-D and 2,4,5-T at 5 p.p.m., they were phytotoxic.

723. Bloom, J. R., and Walker, J. C.
Effect of nutrient sprays on fusarium wilt of tomato.
Phytopathology, 1955, **45**: 443-4, bibl. 3.

Various nutrient elements were applied to tomato plants as foliage-spray supplements to a balanced solution supplied through the roots. When nitrogen in the form of urea was applied before inoculation of the plants with *Fusarium oxysporum f. lycopersici* (Sacc.) Snyd and Hans., the disease was retarded progressively with increasing concentrations; when it was applied after inoculation, disease development increased with increase in concentration. When applied before inoculation, neither potassium chloride nor sodium chloride had any significant effect on wilt development but there was an increase in disease index with increase in concentration of each, when applied after inoculation. Calcium chloride, on the other hand, had no significant influence on wilt. When potassium chloride and calcium chloride were combined in the foliage spray, the effects of the former were counteracted. The effects of monobasic sodium phosphate, sodium glycerophosphate, magnesium sulphate, and magnesium chloride were not significant. —[From authors' summary.]—Univ. Wisconsin, Madison. [See also *H.A.*, 24: 524.]

724. Beach, W. S.
Tomato spraying in absence of late blight.
Bull. Pa agric. Exp. Stat. **603**, 1955, pp. 9, illus.

This bulletin records the results of various spraying or dusting treatments of tomatoes for five years in which late blight was not present. Increased yields represent control of early blight, anthracnose and certain rots. The six best fungicidal treatments, which include maneb and zineb in straight schedules as well as ziram and maneb in different combinations with tribasic copper sulphate or with each other, gave quite similar average yields. Average increases over no treatment ranged from 2·1 to 2·7 tons per acre for mature fruit and from 3·4 to 4·4 tons for mature and sizeable immature fruit combined. The straight schedule of tribasic copper sulphate gave an average increase of only 1·4 tons per acre of mature fruit. There is evidence that this small increase results from a lower set of fruit. The chief adverse effects of fixed copper fungicides can be avoided: (1) by applying them in full strength only in the latter part of the season after most of the fruits have set and using organic fungicides, especially ziram, in the first part, or (2) by combining the two types of fungicide in a tank mixture using various proportions of each. Dust treatments were somewhat less effective than the corresponding spray treatments. [From author's summary.]

725. Strømme, E.
Ammonia formation and plant growth in steam sterilized soil
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The author discusses the results of experiments carried out to study the effect of steam sterilization on changes in the nitrogen status of the soil and on the growth of tomato plants. Results indicate that the liberation of ammonium nitrate accounts for most, but not all, the increased growth noticeable after steam sterilization. Other factors such as improvement of soil structure appear to play a part.—Agric. Coll. Vollebekk, Norway.

726. Bravenboer, L.
Soil disinfection with fumigants in glasshouse tomatoes.
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

DD(dichloropropane ± dichloropropene), ethylene-dibromide and chloropicrin are now used for sterilization of tomato soils. The first two are purely nematocides whereas chloropicrin deals effectively not only with eelworms but also with corky core and with verticillium wilt disease, especially in light soils. Results are better from August than from later treatments. All these substances, especially chloropicrin, also have a growth stimulating effect.—Exp. Hort. Stat., Naaldwijk.

727. Krisnamurthi, S., and Subramanian, D.
2,4-dichlorophenoxyacetic acid applied to eggplant, *Solanum melongena*, L.
From summary Pap. 14th int. hort. Congr. 1955, Scheveningen, *see note p. 4*.

The application of 2,4-D at 3 concentrations as paste, 2 concentrations in spray and 3 concentrations as dust to freshly opened flowers of the Long Black eggplant variety, after clipping stamens and stigma, resulted in every case in increased yield. 2,4-D, even at very low concentrations, applied to the seed before sowing inhibited germination. Eggplant proved more resistant to 2,4-D at high concentrations than tomato.—Annamalai Univ., Annanalainagar, Chidambaram, S. India. [See also *H.A.* 24: 2834 and 25: 698.]

728. McCollum, J. P.
Discolored pepper seed made salable.
Seed World, 1955, **77**(2): 8, illus.

Capsicum seed often becomes discoloured as a result of the action of micro-organisms. This may have little effect on the germination capacity of the seeds but it greatly detracts from their market value. Bleaching the seed in a 2% solution of sodium hypochlorite is a cheap method of removing discoloration. The time required for bleaching depends on the amount of discoloration but treatments longer than 20 minutes may cause some reduction and delay in germination. The treatment will also disinfect the seeds.—Univ. Illinois.

729. Cox, R. S.
Compatibility between streptomycin and copper in the control of bacterial spot of pepper.
Plant Dis. Reptr, 1955, **39**: 616.

In tests during 1954/55 weekly applications of streptomycin gave commercial control of *Xanthomonas vesicatoria* on peppers. The lowest effective dosage was 200 p.p.m., and effectiveness increased up to 400 p.p.m. Two neutral coppers also gave good control. Used in combination with streptomycin they not only proved fully compatible but appeared to exert a considerable additive effect.—Everglades Exp. Stat., Belle Glade, Fla. [See also *H.A.*, 25: 3938.]

730. Krupka, L. R., and Crossan, D. F.
Studies on the use of antibiotics for the control of bacterial spot of pepper.
From abstr. in *Phytopathology*, 1955, **45**: 465.

Field observations in 1954 indicated that infection could re-occur on pepper plants that had been sprayed with varying concentrations and applications of Agrimycin (15% streptomycin; 1·5% oxytetracycline) and crude streptomycin. Studies showed that Agrimycin (1) is not translocated into the leaves; (2) at 250 p.p.m. remains on the leaf surfaces for between 5 and 10 days and affords some protection from infection when inoculation occurs within 5 days of spraying; (3) is not an eradicant, even at 500 p.p.m. [See also *H.A.*, 25: 4059.]

731. Martin, W. J., Horn, N. L., and Cox, J.A.
Fumigation of bell pepper seed beds for controlling damping-off caused by *Rhizoctonia solani*.
Plant Dis. Reptr, 1955, **39**: 678-81, bibl. 1, illus.

Experiments and observations over a 3-year period on the use of methyl bromide fumigation for controlling damping-off due to *Rhizoctonia* [*Corticium*] *solani* Kuehn in bell pepper beds in Louisiana have demonstrated the usefulness of this method and have revealed limitations in one case [in which, for reasons that are obscure, the fumigant proved seriously phytotoxic]. One pound of Dowfume MC-2 per 100 sq. ft. appeared to give effective control and as good control as 2 lb. per 100 sq. ft. Weed control was excellent with either treatment. The cost of the treatment appeared to be less than the cost of labor for weeding beds. [Authors' summary.]—La St. Univ., Baton Rouge.

Noted.

732.

a Barnes, W. C., and Epps, W. M.
Progress in breeding cucumbers resistant to anthracnose and downy mildew.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 409-15, bibl. 8, illus.

b Beneš, V.
Příspěvek k historii vzniku a methodice vyšlechtění odrůdy celeru Olomouckého. **(The history of the origin and method of breeding of the celeriac variety Olomoucký.)** [Russian and German summaries 4 lines each.]
Sborn. čsl. Akad. zeměd. Věd. Rost. Výroba,* 1955, **28**: 93-100, bibl. 8, illus.
Of good quality and relatively drought resistant.

c (Carew, J., and others.)
New vegetable varieties. List II.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 493-511.
Supplement to List I [see *H.A.*, **25**: 493.]

d (Fernhurst Research Station.)
Good results from low pressure steam heating.
Grower, 1955, **44**: 387, 389, 391, illus.
In a tomato house.

e Foytik, J.
California cantaloupe industry.
Calif. Agric., 1955, **9**(11): 2, 16.
Mainly marketing.

f Gilbert, J. C.
Pua Kea—cauliflower for low elevations.
Hawaii Farm Sci., 1955, **4**(2): 1, 5.

g Glavinic, R.
L'hybridation végétative comme methode d'amélioration de tomates. **(Improvement of tomatoes by vegetative hybridization.)**
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4*.
Trophée d'or in a very young stage was grafted on Kartofelisni.—Fac. Sylvic., Belgrade.

---

* Formerly *Sborn čsl Akad. zeměd. Věd, Ser. A.*

h HAHN, P.
Die Eignung der Kohlrabisorten für den Frühanbau im Gewächshausblock. **(The suitability of kohlrabi varieties for early cultivation in the glasshouse.)**
Dtsch. Gartenb, 1955, **2**: 246-8.

i HALL, C. B., AND DENNISON, R. A.
Environmental factors influencing vascular browning of tomato fruits.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 353-6, bibl. 5.
[See *H.A.*, **25**: 2966.]

j HAMLYN, B. M. G.
Aphid transmission of cauliflower mosaic on turnips.
Plant Path., 1955, **4**: 13-16, bibl. 7, illus.
By *Myzus persicae* and *Brevicoryne brassicae*.

k HARRIS, J. H., AND COVINGTON, H. M.
Farm and home garden manual.
Ext. Circ. N.C. agric. Ext. Serv. **122**, revised 1955, pp. 12, bibl. 13, illus.
Recommended vegetable varieties and their cultivation in North Carolina.

l H[EWITT], C. W.
Investigations 1953. Vegetables. Tomato.
Bull. Dep. Agric. Jamaica **53**, [undated], pp. 141-5, 2s.
Fertilizer trials.

m HILLS, O. A., AND TAYLOR, E. A.
Cantaloup insects in the South-west. How to control them.
Leafl. U.S. Dep. Agric. **389**, 1955, pp. 8, illus.

n IBBETT, W. C.
Is sugar spraying worth while?
Comm. Gr, 1955, No. 3112, p. 357.
Pros and cons for glasshouse crops.

o JACKS, H., AND WEBB, A. J.
Compatibility of spray materials used in New Zealand on tomatoes, 1955.
Orchard, N.Z., 1955, **28**: 16-17.
Tabulated.

p JACKS, H.
Disinfection of glasshouse soil. Control of soil-borne diseases and pests by application of heat or chemicals.
Bull. N.Z. Dep. Agric. **314**, 1955 (revised), pp. 19, illus.
With a section on application of soil fumigants in the field.

q JAGER, H.
Quantitative determination of allicin in fresh garlic.
Arch. Pharm. Berl., 1955, **288**: 145-8, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-122.

r LAMM, R.
Fertilizer experiments with glasshouse tomatoes.
From summary *Pap. 14th int. hort. Congr.* 1955, Scheveningen, *see note p. 4*.
An account of trials in south Sweden in the years 1952-1954.

s MALLIK, P. C., AND CHOUDHURY, B.
Detection of root-knot nematode (*Heterodera schachtii* Schmidt) at Sabour, Bihar.
Sci. and Cult., 1955, **21**: 213-14, illus.
On eggplant, bottle gourd, tomato and papaw.

t MARVEL, M. E.
Results of vegetable variety trials in West Virginia, 1954.
Circ. W. Va agric. Exp. Stat. **96**, 1955, pp. 7, illus.
Tomato, cauliflower and broccoli.

u MAURICE, —.
Rôle de l'humus et de la fumure minérale dans les cultures maraîchères. **(The role of humus and mineral fertilization in vegetable gardening.)**
Tunis. agric., 1955, **56**: 110-18.

v VAN MIDDELEM, C. H., AND WAITES, R. E.
Residues of toxaphene, chlordane, parathion, malathion and demeton on several fresh vegetables.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 365-70, bibl. 11.

w NEW SOUTH WALES, DEPARTMENT OF AGRICULTURE.
Diseases of the cultivated mushroom.
Plant Dis. Leafl. N.S.W. Dep. Agric. **133**, 1954, pp. 4, illus.

x NOVIKOF, V. A.
Le choix des variétés des principaux légumes et leur mode de culture en Tunisie. **(The chief vegetables grown in Tunisia: choice of varieties and methods of culture.)**
[*Publ.*] *Serv. bot. agron. Tunis.*, pp. 11 (unnumbered), [received 1955].
A short introduction and a table give brief data on 27 kinds.

y QUADT, F.
Beobachtungen an den Nachkommen tetraploider Tomatenbastarde. **(Observations on the progeny of tetraploid tomato hybrids.)**
Züchter, 1955, **25**: 241-5, bibl. 27, illus.

z RAWLINS, W. A.
***Rhizoglyphus solani*, a pest of onions.**
J. econ. Ent., 1955, **48**: 334, bibl. 1, illus.
Injury caused by the mite *R. solani*, reported for the first time as attacking onions.

733.

a RICHARDSON, B. H., AND WENE, G. P.
Control of the onion thrips in South Texas in 1954.
J. econ. Ent., 1955, **48**: 310-11, bibl. 3.

b SCOTT, F. M., AND HAMNER, K. C.
Electron microscope study of cell wall growth in the root of onion, *Allium cepa*.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxvii.

c Severance, C. E., and Koch, K. A.
Irrigation on Louisiana farms.
Ext. Publ. La Div. agric. Ext. **1180**, 1955, pp. 20, bibl. 15, illus.
For vegetables, vines and strawberries.

d Shear, G. M.
Watercress cultivation and marketing.
Market Grs' J., 1955, **84**(9): 8-9, bibl. 3, illus.

e Sylvester, E. S.
Lettuce mosaic virus transmission by the green peach aphid.
Phytopathology, 1955, **45**: 357-70, bibl. 67.
The virus-vector relationships were proved to be of a non-persistent type.

f Thomas, C. A.
Pests of cultivated mushrooms.
Market Grs' J., **84** (8): 22, 32, illus.
Habits and control of fly, mite and nematode species.

g Thompson, B. D., and Van Middelem, C. H.
The removal of toxaphene and parathion residues from tomatoes, green beans, celery and mustard with detergent washings.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 357-64, bibl. 10.
[See also *H.A.*, 25: 524.]

h Trim, L. G.
Pod quality in French beans.
Qd. agric. J., 1955, **80**: 319-22, illus.
Market requirements, varieties and crop management.

i Ullrich, J.
Schwarzringfleckigkeit des Kohls in Deutschland. (**Black ringspot of cabbage in Germany.**)
Nachr.Bl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 164-5, bibl. 5, illus.

j Uschdraweit, H. A.
Chenopodium quinoa als Testpflanze für das Gurkenmosaik. (***Chenopodium quinoa* as an indicator plant for cucumber mosaic.**)
NachrBl. dtsch. PflSchDienst. Braunschweig, 1955, **7**: 151-2, bibl. 1, illus.

k Walker, J. C., and Pierson, C. F.
Two new cucumber varieties resistant to scab and mosaic.
Phytopathology, 1955, **45**: 451-3, bibl. 5.
Wisconsin SMR 9 and SMR 12.

l Zeck, E. H.
The vegetable weevil (*Listroderes obliquus*).
Agric. Gaz. N.S.W., 1955, **66**: 293-4, illus.
Biology and control by BHC bait.

TOBACCO.

General.

(*See also* 8, 47, 63, 78, 87, 89, 802a, c, d, m, o, q, t, 1072, 1237, 1239, 1259, 1261.)

734. Balcar, J., and Škula, K.
Rajonizácia tabaku v CSR. (**The regional distribution of tobacco areas in Czechoslovakia.**) [Russian summary ⅓ p.]
Reprinted from *Pôdohospodárstvo*, 1954, **1**(1): 38-58, bibl. 43.

The authors discuss the factors determining the distribution of tobacco in Czechoslovakia. They classify the tobacco growing regions on a basis of the suitability of their soil and climatic conditions for the different types of tobacco grown, namely cigarette, both flue-cured and oriental, cigar, cigar wrapper, pipe and tobacco grown for purposes other than smoking. These regions are then subdivided into districts based on the yield and quality of the varieties grown in each.

735. Sastry, A. S.
Recent trends in chemical research on tobacco in the United States and their applicability to Indian conditions.
Indian Tobacco, 1955, **5**: 123-9, bibl. 7.

A brief comparison is included of the American and Indian practices in spacing, manuring, curing and grading flue-cured tobaccos and curing and fermenting cigar tobaccos.—Cigar and Cheroot Tob. Res. Stat., Vedasandur, S. India.

736. Marcelli, E., and Ciferri, R.
Indagine sull'ambiente climatico e pedologico della Lomellina con riferimento alla coltura del tabacco da fascia sotto garza. (**Investigations on climate and soil conditions in the Lomello district in connection with the culture of wrapper tobacco under shade.**)
Tabacco, 1955, **59**: 219-47, bibl. 6.

Climatic and soil conditions at Cava Manara in the Lomello district of Pavia, where the first major Italian experiment in shade-growing began in 1951, were studied and are compared with those in Sumatra and in shade-grown tobacco localities in the United States and Cuba.

Breeding, selection and varieties.

(*See also* 802h, u.)

737. Bolsunov, I.
La sélection des tabacs dans les pays de l'Europe. (**Tobacco selection in Europe.**)
Rev. int. Tabacs, 1955, **30**: 171-80, 195-206.*

Brief notes are given on important European and introduced varieties and on the research stations engaged on tobacco selection and breeding and the various methods they use. It is considered that future research should be directed towards the production of varieties with the following attributes: (1) retention of flavour and technological qualities on a wide range of soils; (2) high, uniform yields; (3) resistance to adverse climatic factors; (4) minimum labour requirements: (5) purity through the reduction of spontaneous mutations; and (6) earliness.

---

* Being a paper read at the First International Scientific Tobacco Congress, Paris, 1955.

738. Bolsunov, I.
Die Schaffung von Tabaksorten ohne Blattachselknospen und die praktische Durchführung dieses Zieles. (**The breeding of non-suckering tobacco varieties and practical methods of achieving this aim.**) English summary ⅓ p.]
Reprinted from *Fachl. Mitt. öst. Tabakreg.*, 1955, Heft. 1, pp. 12, bibl. 19, illus.

Strains of non-suckering plants have not been found among varieties and races of *Nicotiana* species, and investigations have failed to discover axillary bud atrophy amongst artificially-induced mutants. The genetical character for side-shoot formation has not yet been sufficiently studied, but is known to vary with environmental conditions. The following methods have been used to breed tobacco varieties with a weakened tendency for suckering: (i) crossings between varieties of different genotypes showing weak lateral development; (ii) hybridization between geographically-separated varieties, different ecotypes and sub-species: (iii) hybridization of tobaccos having normal growth but a reduced tendency to sucker with giant races and multi-leaved tobaccos; (iv) crossing suckering tobaccos with races showing abnormal lateral growth. From such breeding work, early- and late-maturing varieties of *Nicotiana rustica*, high yielding uniform, burley hybrids and multi-leaved cigarette tobaccos for air-curing have been obtained which only need desuckering once.

739. Bolsunov, I.
Méthodes de la sélection de tabacs très pauvres en nicotine. (**Methods of selecting nicotine-poor tobaccos.**)
Rev. int. Tabacs, 1955, **30**: 3-7, 35-42.

Possible methods are enumerated. The most promising is considered to be intervarietal crossing within *Nicotiana tabacum*.

740. Anon.
Essais de tabac. (**Tobacco trials.**)
Rev. int. Tabacs, 1955, **30**: 55.

In trials made by the Bergerac Institute the varieties B$_4$ 28 J.I.C. No. 15 and D.V./Y 10 No. 11, when topped at 16-18 and 15-17 leaves respectively, both gave promise of excelling the native Paraguay as cigar wrapper tobaccos, which are in short supply. They gave higher gross yields per ha. and a higher proportion of wrapper leaf, and, since the texture is finer, a given weight of leaf made more cigars.

741. Cantillon, P.
Essais sur tabac. (**Tobacco trials.**)
Rev. Agric. Brux., 1955, **8**: 1047-8.

In tests in 1952-54 five varieties bred at Gembloux research station gave yields ranging from 21%, in the case of H.23-1, to 2% above those of the control, Philippin.

742. Heggestad, H. E., and Clayton, E. E.
Development of burley varieties of tobacco resistant to black shank, fusarium wilt, wildfire, tobacco mosaic and black root-rot.
From abstr. in *Phytopathology*, 1955, **45**: 463.

Tobacco varieties Burley 11A and Burley 11B, recently developed and released, have combined resistance to black shank (*Phytophthora parasitica* var. *nicotianae*) and black root-rot (*Thielaviopsis basicola*). Burley 11B is slightly the more resistant to these diseases but is somewhat inferior in yield and quality. Another new variety, Burley 21, combines resistance to wildfire (*Pseudomonas tabaci*), tobacco mosaic, and black root-rot.

743. Jauch, C.
Marchitamiento del tabaco en Misiones. (**Tobacco wilt in Misiones.**)
Idia, 1955, No. 85, pp. 29-30, illus.

The commercial varieties most susceptible to fusarium wilt in Misiones province of Argentina are Kentucky, Maryland and Criollo Misionero.

744. McLeod, A. G.
Resistance of tobacco varieties to black root-rot.
N.Z.J. Sci. Tech., Sect. A., 1955, **37**: 100-2, bibl. 4.

Forty-three tobacco varieties, twenty-two breeding lines, and three *Nicotiana* species were grown in seedling beds infected with *Thielaviopsis basicola*. Infected material was graded into four classes based on visual examination of the roots of thirty plants in each line. Classification of resistance closely agrees with field performance of the material.—[Author's summary.] Xanthi, Jadel, Little Dutch and Delcrest 267 showed no infection and were graded highly resistant.—Tobacco Res. Stat., Motueka.

745. Wark, D. C.
A heritable variation in tobacco of palatability to looper caterpillars.
J. Aust. Inst. agric. Sci., 1955, **21**: 189-92, illus.

In North Queensland in 1952-54 some tobacco varieties including Maryland Mammoth, were observed to be unpalatable to *Plusia argentifera* caterpillars. Experiments with Maryland Mammoth F$_1$ and F$_2$ hybrids and other varieties in 1953-55 showed that varieties differ in their palatability and suggest that many genes are involved in determining relative palatability.—C.S.I.R.O., Canberra.

Seedbed and cultural practices.

(*See also* 802b, e, f, j.)

746. Bulman, G. R. W.
A reverberatory seedbed furnace.
Rhod. Tobacco, 1955, No. 9, p. 3, illus.

Instructions are given for the construction and use of a simple device consisting of a ⅛ in. steel plate, 12 ft. long and 6 ft. wide, rolled into a semi-cylinder 4 ft. 6 in. in diameter and strengthened by 31½ × 1½ in. angle-iron half-rings. The gadget which costs about £20 forms a cover over brushwood burnt on the seedbeds and is moved about 1 yard every 5 minutes. Its main advantages include large savings in fuel, complete combustion and even distribution of heat.

747. SCHMID, K.
Über die Bedeutung des Fruchtwechsels für den Tabakbau und über die versuchsweise Anwendung von "Larvacide" zur Bodenentseuchung. **(On the importance of rotation for tobacco growing and on the experimental application of Larvacide for soil sterilization.)**
Dtsch. Tabakb., 1954, pp. 129-32, from abstr. in *Z. PflKrankh.*, 1955, **62**: 700.

Soil treatment with chloropicrin for *Thielavia basicola* control increased tobacco yields considerably, but the resulting high chlorine content of the leaf affected quality adversely, even in a low-grade variety. A three-year rotation, with two years of cereals, raised tobacco yields by 30% as compared with fields on which tobacco crops succeeded one another.

748. HUTTER, W., AND BOURGIN, G.
Essais de sous-solage effectués sur tabac à la Station Expérimentale de Sidi-Slimane. **(Subsoiling trials on tobacco at Sidi-Slimane experimental station.)**
Terre maroc., 1955, **29**: 323-7.

In tests covering several years subsoiling clay soils to a depth of 0·5 m. had no effect on the yield of unirrigated crops except in one year in which the rainfall was abnormally high after planting, when it resulted in an increase of 21%. In irrigated crops it gave yield increases of 34 and 27% respectively in the 2 years of the trial. The test varieties were Kentucky and Burley.

749. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA.
Tobacco investigations.
A.R. C.S.I.R.O., 1954, 1954, pp. 24-5.

Frenching. In field tests at Katherine, Northern Territory, frenching occurred in furrow-irrigation but not in spray-irrigation plots. High-ridging appeared to reduce incidence. *Sucker control.* The application of 2-4 ml. mineral oil to the cut end of each stem when the flowering head was excised gave 70-100% control of suckering in north Queensland.

750. HITIER, H., AND IZARD, C.
L'inhibition des bourgeons du tabac après écimage. **(The suppression of tobacco suckers after topping.)**
Ann. Inst. exp. Tabac de Bergerac, 1954, **2**(1): 23-35, from abstr. in *Tabacco*, 1955, **59**: 286-7.

Vegetable oils in soapy emulsions at 30% concentration used at 1 c.c. per plant caused only partial suppression of suckering and the treatment had to be followed by desuckering by hand in all cases. Walnut oil showed promise. Other materials tried, mineral oils and the diethanolamine salt of maleic hydrazide, were phytotoxic.

751. BOLSUNOV, I.
Erhöhung des Zuckergehaltes der Blätter und Beschleunigung ihrer Reife bei manchen Solanaceaearten durch Phloembehandlung. **(Phloem treatment as a means of raising the sugar content of the leaves and inducing earlier ripening in several species of Solaceae.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Experiments were made with *N. tabacum*, *N. rustica* and tomatoes. The result of greatest practical value resulted from injecting the stem of a Virginia flue-cured type of tobacco with sugar solution. The sugar content of the leaves was more than doubled in some cases and the nicotine content fell. The Austria Tobacco Establishment has now constructed a tool for treating the stems on a large scale.—Tabakzüchtungstat., Fürstenfeld, Austria.

752. ANON.
Influence de la maturité sur la qualité du Burley Maroc. **(Effect of maturity on quality in Moroccan Burley.)**
Rev. int. Tabacs, 1955, **30**: 83-4.

In a trial on unirrigated Burley at Ksiri, Morocco, in 1953, harvesting leaves when fully mature, compared with harvesting 10-15 days earlier, gave the following results: (1) grade fell from B to C. (2) Weight per 100 sq. cm. leaf excluding midrib increased by 10%. (3) The weight ratio of midrib to leaf increased by approximately 2·5%. (4) Leaf thickness increased by 12·5%. (5) Nicotine content increased by 15-25%. It was concluded that to obtain a better quality, thinner, lighter, milder tobacco and to reduce waste unirrigated Burley should be harvested, 3 leaves at a time, when these first become sufficiently mature, i.e., between 60 and 70 days after planting.

Nutrition and irrigation.

(*See also* 1202.)

753. RICHARD, J., AND WHITE, F. H.
Methods of fertilizer application in tobacco growing.
Lighter, 1955, **25**(2): 12-14.

An experiment conducted by L'Assomption Experiment Station at St. Thomas (Joliette) in 1940/44 showed that flu-cured tobacco requires 24 lb. N, 144 lb. P_2O_5 and 120 lb. K_2O per acre for normal growth and that this is supplied by 1200 lb. 2:12:10. In a further experiment at St. Thomas in 1949-53 to verify this finding the control received the above-mentioned fertilizer and the other treatments received the same plus extra N, P_2O_5 or K_2O applied in spring or autumn either broadcast before ploughing or ploughed in. The largest return was given by an extra 50 lb. K_2O broadcast in spring. Together with the regular fertilizer this amounted to 1200 lb. 2:12:14 per acre. In a similar experiment, in which the control received 1,000 lb. 5:8:10 per acre, none of the other treatments had any significant effect.

754. WALKER, E. K.
Fertilization of irrigated flue-cured tobacco.
Lighter, 1955, **25**(1): 13-16.

Fertilizer experiments [in Ontario] with irrigated flue-cured tobacco in 1953 and 1954 indicated that the same fertilizer ratio may suffice for both irrigated and non-irrigated crops. Although, as with non-irrigated tobacco, additional applications of K may be beneficial for some soils, there was no benefit derived from increased K under the conditions of this experiment. Applications of N above the standard amount of 20 lb. per acre reduced the quality of the leaf. Quality yield and returns were increased by supplemental irrigation. Chemical and physical determinations indicated that high quality leaves were low in N and nicotine and medium in thickness with a low per cent of stem. [Author's summary.]

755. McDonald, I.
The fertilizer recommendations for the 1955-56 crop.
Rhod. Tobacco, 1955, No. 10, pp. 5-7.

The recommendations outlined here include: (1) Fertilizer should be applied in 2 bands 8 in. apart on a level with the root crowns and not more than 4-5 in. below the top of the ridges. (2) Application should be made at the time of planting, or up to a few weeks beforehand if planting is to coincide with the first rains, or up to a few days beforehand if planting is to be done after the onset of the rains. (3) Split applications and extra N are not recommended. (4) P_2O_5 and K_2O should be applied at 100 (or 140 on clay loams) and 90 lb. per acre respectively. (5) Nitrogen is critical and the rate depends on soil type and management; late-ploughed virgin land, for example, requires up to 40 lb. per acre while sands or early-ploughed virgin land require only 14-28 lb. (6) To control Mg and B deficiency 45 lb. magnesite or 100 lb. dolomite and 2 lb. borax respectively should be applied separately or with the fertilizers.—Tob. Res. Bd, Rhodesia and Nyasaland.

756. Bates, T. E.
Should you top-dress tobacco?
Rhod. Tobacco, 1955, No. 10, pp. 7-8.

The following recommendations are made on N manuring: (1) Split applications should not be made on early planted tobacco or on sandy loams or clay loams. (2) With late plantings or on deep sandy loams, where heavy rain is expected within 3 weeks of planting, part of the N requirement should be withheld and applied within 3 weeks of planting. (3) Once the normal requirement has been applied no extra N should be given later in the season.—Tob. Res. Bd, Rhodesia and Nyasaland.

757. Garmany, H. F. M.
Some effects of fertilizer on the chemical composition and other properties of flue-cured tobacco.
S. Afr. J. Sci., 1955, **52**: 12-16, bibl. 17.

Fertilizer experiments carried out at the Kutsaga Station showed that the N and K contents of flue-cured tobacco leaf were directly influenced by the amount of fertilizer applied. N and P fertilization of the preceding grass crop increased the N content of the tobacco leaves. More N and K were absorbed by plants receiving sulphate of potash than by those receiving K from other sources. Increasing the rates of applied K resulted in a higher percentage moisture in the cured leaf, the highest moisture percentage being found in plants receiving potassium chloride. An excess of N in the fertilizer increased crop losses due to *Alternaria longipes*, but high rates of K associated with excessive N reduced such losses.—Tob. Res. Bd, Rhodesia and Nyasaland.

758. Cawthron Institute.
Chemical research. Chemical investigations.
A.R. Cawthron Inst., 1954-55, pp. 35-7.

Studies on the effect of fertilizers on tobacco leaf showed that the Ca content was reduced by increasing the amount of potash in the fertilizer. The magnesium content responded similarly. K content increased with increased K in the fertilizer, and less markedly with increased P. The content of reducing sugars rose with an increase in K. The use of maleic hydrazide for lateral control did not greatly affect the sugar content of the cured leaf. Leguminous green manure crops increased N and reduced sugar contents in the succeeding tobacco crop. Tobacco following barley had the highest sugar content. Mustard as a green manure crop gave tobacco with low N and good sugar contents. In experiments to control "breakdown" of tobacco leaf, copper sulphate dressings increased sugar content, as well as giving some control of the disorder. The total N content of the leaf was lowest with the largest Cu applications.

759. Nishikawa, G., and Ichishima, K.
Effect of fertilizing potassium on leaf quality of bright yellow tobacco. [Japanese, with English summary.]
Proc. Crop Sci. Soc. Japan, 1952, **21**(1/2): 172-3, from abstr. in *Biol. Abstr. Sect. D*, 1955, **29**, No. 24589.

Tobacco seedlings of an American yellow-leaf variety grown in pots received normal quantities of N and P_2O_5, and K_2O, as sulphate, in amounts ranging from 0 to 8 g. per pot. As the amount of K supplied increased there were decreases in plant height, number of usable leaves and mean length of stem internodes, and increases in numbers of cells per unit of leaf area and K content. Leaf thickness reached a maximum with 4g. K_2O and decreased again with larger amounts. Fresh weights of the middle and upper leaves were reduced by excessive K. There were no definite relationships between N, nicotine and glucose contents and amount of K supplied. The nicotine-total N ratio was highest in the middle leaves of plants receiving 2g. K_2O, and with larger amounts of K the ratio declined. Ash and water-soluble alkali were highest in the leaves of plants receiving 4g. K_2O.—Fac. Agric., Univ. Tokyo.

760. Steinberg, R. A., Specht, A. W., and Roller, E. M.
Effects of micronutrient deficiencies on mineral composition, nitrogen fractions, ascorbic acid and burn of tobacco grown to flowering in water culture.
Plant Physiol., 1955, **30**:123-9, bibl. 18.

The absorption and accumulation of elements was studied in tobacco plants grown to flowering in complete and micronutrient-deficient cultures in both spring and autumn. Greenhouse temperatures were kept at about 25° C. The experimental adjustment of the basal nutrient solution to produce maximum yield with a minimum of salts resulted in an "economical" solution, i.e. net absorption of nutrient constituents by the plant, amounting to over 93% of the total supplied, was effected without changing the proportions of the nutrient components in either the solution or the plant as a whole. The computed values for the mineral composition of whole, air-dried plants were highest in the autumn-grown plants. A steady rise in P, K, Ca and Mg contents was associated with decreased growth caused by various micronutrient deficiencies. Micronutrient deficiencies affected leaf composition in a specific manner far more than the composition of the whole plant. Most of the nitrogen values, taken on a dry-weight basis, for spring-grown plants increased regularly with decreased yields; nitrate and free amino acids increased, and protein decreased, in the leaves at both seasons of the year with all types of micronutrient deficiency except copper. Molybdenum deficiency caused outstanding nitrate accumulation in the leaf in both seasons. A decrease in ascorbic acid content of the lamina seemed to take place whenever the deficiency was severe enough to decrease the yield. The ascorbic acid content was most effectively decreased by deficiencies of B and Mo. Only Mn and B deficiencies affected burning quality to any extent.—U.S.Dep. Agric., Beltsville, Md.

761. Struckmeyer, B. E., and Wedin, W. F.
Some effects of sulphate and chlorine levels on the anatomical structure of the stems and leaves of tobacco.
From abstr. in *Plant Physiol*, 1955, **30** (Suppl.): xxxiii-xxxiv.

Tobacco plants, grown at nutrient levels of 0, 35, 70, and 140 p.p.m. chloride and 0, 48, 96, and 192 p.p.m. sulphate, were examined. In the absence of sulphate the sixth internode from the base of the plant showed inhibition of xylem and phloem differentiation; the cells of all the tissues were smaller and thinner walled; pericyclic fibres were not formed, and the cambium was less distinct than in plants given a normal supply of sulphate. In chlorine deficient plants, xylem differentiation was about one-quarter normal, while phloem was apparently unaffected. There were no conspicuous differences in cell size and wall thickness. Increasing chlorine supply caused increased differentiation of xylem and tissue maturation.—Univ. Wisconsin, Madison.

762. Wedin, W. F., and Struckmeyer, B. E.
Some effects of sulfate and chlorine levels on the growth and "leaf burn" of tobacco.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxiv.

Plants of Havana 307 cigar type tobacco grown at nutrient levels of 0, 35, 70 and 140 p.p.m. chloride and 0, 48, 96 and 192 p.p.m. sulphate were examined. At early stages of plant growth all plants grown in nutrient solutions were normal except those receiving a solution lacking sulphur, in which the young leaves were light green with slight curling under of leaf tips. "Leaf burn", as tested at the tip, middle and base of all leaves after curing, decreased with increased chloride supply. Increasing levels of sulphate appeared to have the same effect, although the differences were not so striking.—Univ. Wisconsin, Madison.

763. Elliot, J. M.
Effect of chlorine on flue-cured tobacco.
Lighter, 1955, **25**(2): 15-18, bibl. 4.

The results obtained from Cl fertilization experiments with flue-cured tobacco [at the Delhi Substation] in 1953 and 1954 indicate that fertilizers with a maximum of 3% Cl are not detrimental to the burn of the cured leaf. Data indicate that when the Cl level of the leaf is below 1% the burn is not materially altered, but a very unfavourable dark ash results when pyrolysis takes place at Cl levels of 1% or above. An increase of Cl from 2 to 3% in the fertilizer may increase the returns per acre because of higher yields. From the observed Cl values of leaf samples from farms in the area, the importance of blending large quantities of tobacco representing many farms is apparent, otherwise the consumer would not have constancy in cigarette burn and ash colour. [From author's discussion.]

764. Neas, I., and Haslam, J.
Supplemental irrigation of tobacco, 1954-55.
Rhod. Tobacco, 1955, No. 19, pp. 25-6.

In experiments at Kutsaga in 1954/55 tobacco was transplanted at 10-day intervals during the 2-month period preceding the first rains on November 8, 0·5—0·75 in. of water being applied by overhead sprinkler on planting out followed by 0·6–1·25 in. every 2-3 weeks. Early plantings consistently gave substantial yield increases by comparison with planting out after the first rains, but only the 2 latest improved the grade index. Best results were given by planting 2 weeks before the first rains, the yield per acre and grade index being 2126 lb. and 56·5, respectively, compared with 930 lb. and 49·5 for tobacco planted immediately after the first rains.

765. Diem, M.
Das Mikroklima in einem künstlich beregneten Tabakbestand. **(The microclimate of a sprinkler irrigated field of tobacco.)**
Arch. Meteorol. Geophys. Bioklimatol., Ser. B, 1953, **5**(2): 215-33, from abstr. in *Biol. Abstr. Sect. D.*, 1955, **29**, No. 20784.

A field of tobacco of 5 ha. was sprinkler irrigated every night with a precipitation of 8-10 mm. The increase in gross yield to almost 3 times justified the cost of the irrigation installation. In the climate caused in a closed field by irrigation all the extremes were moderated. The daily variation of temperature decreased, the humidity remained higher and the soil was moist around the roots. The humidity in the field always remained above 45%, whereas it fell below this value for 7½ hrs. in the non-irrigated surrounding. The temperature of a tobacco leaf in a field of tobacco generally differed but little from that of the surrounding air and fell only for a short time below dew point temperature with the production of dew or fog. By computing the thermal diffusivity from the temperature of the soil layers below 20 cm. one could prove that even at this depth the soil was moist.

Physiology.

(*See also* 802k.)

766. Coolhaas, C.
Preliminary research with tobacco in artificial environment.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Trials are reported in which Delcrest Virginia tobacco plants were submitted to different constant temperatures by night and day, to different relative humidities and to water culture with and without overhead irrigation. The resultant differences in growth are recorded.—Lab. trop. Plant Breed., Wageningen.

767. Singh, A., and Batra, B. M.
Photoperiodic response in *Nicotiana rustica*.
Indian Tobacco, 1955, **5**: 137-9, bibl. 1, illus.

The number of days taken by T.218, a high yielding but late-flowering strain of *N. rustica*, from the establishment of the seedling in February to the opening of the first flower was reduced from 45 to 30 by providing supplementary light for some 12 hours per night. Vigour was increased by the treatment.—Hookah Tob. Res. Sub-Stat., Ferozepur, Punjab.

768. Vlitos, A. J., Shapiro, S., and Meudt, W.
Responses of photoperiodically sensitive plants to continuous (chronic) gamma radiation.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xx.

Maryland Mammoth tobacco plants were exposed to chronic gamma radiation, at dosages ranging from 50 to 430 Roentgens per day. Long-day conditions prevailed during the experiment. Flowering occurred under long-day conditions directly in the gamma field in plants which received 50 r per day for 2 months. Plants which received 150, 165, 300 and 450 r per day flowered when removed from the gamma field and grown under long days in the greenhouse. Controls grown without gamma radiation flowered only in short days.—Boyce Thompson Inst., and Brookhaven nat. Lab., N.Y.

769. Okuyama, M., and Hunada, T.
On the tobacco plant as affected by climatic factors. 1. On the change in leaf structure by light intensities. [Japanese, with English summary.]
Proc. Crop. Sci. Soc. Japan, 1952, **21**(1/2): 170-1, from abstr. in *Biol. Abstr. Sect. D*, 1955, **29**, No. 24590.

Studies were made on the effect of shading on tobacco leaf grown under three sets of light intensities. A covering of Victoria Lawn cloth was used in three successive experiments during 1949 and 1950. The leaf area increased by 30% and 80% in tobacco plants grown under a single cloth covering and under a treble cloth covering, respectively. The thickness of the leaves was markedly reduced by shading. The leaves grown under stronger light had more palisade cells per unit of length and longer palisade and spongy mesophyll cells. The mesophyll quotient (palisade/spongy) was larger in the leaves of shaded plants. The epidermal cells of both the upper and lower sides of the leaves grown under shade were slightly reduced in dimension and thickness. The volume of intercellular space, as a percentage of the volume of whole leaf tissue, was found to increase under reduced illumination. Shaded leaves had a smaller number of stomata per unit area and larger stomata cells, compared with those of the leaves under stronger light. The leaves of unshaded plants had larger fresh and dry weights per unit area and a higher specific gravity than those of shaded plants.—Monopoly Corp., Okayama Tob. Lab.

770. Tombesi, L.
Andamento di alcune attività enzimatiche e del contenuto in chetoacidi, N proteico, glucosio, amido ed acido citrico durante le fasi del ciclo vegetativo di *Nicotiana tabacum* var. Virginia bright. **(Enzyme activity and contents of keto-acids, protein N, glucose, starch and citric acid during phases of the growth cycle of *Nicotiana tabacum* var. Virginia bright.)**
Tabacco, 1955, **59**: 248-56, bibl. 4.

Investigations showed that (1) phenoloxidase and carbonic anhydrase were practically absent during the early stages of growth and tended to increase up to anthesis and seed formation; (2) in the leaf the glucose content is only high before flowering and during seed formation and is, in general, inversely proportional to the starch content; (3) the citric acid content is very low. The part played by polyphenoloxidase and ascorbic acid in the synthesis of coloured compounds of the quinone type is discussed.

771. Tombesi, L.
Andamento di alcune attività enzimatiche e del contenuto in chetoacidi, N proteico, glucosio, amido ed acido citrico durante le fasi del ciclo vegetativo di *Nicotiana tabacum* var. Kentucky. **(Enzyme activity and contents of keto-acids, protein N, glucose, starch and citric acid during phases of the growth cycle of *Nicotiana tabacum* var. Kentucky.)**
Tabacco, 1955, **59**: 309-16, bibl. 4.

The principal results of the investigation described were: (1) Oxidase and carbohydrase activity rose from average values of 230 μl. oxygen and μl. carbon dioxide respectively in the early stages of growth to 2,000 and 350 respectively during anthesis and seed formation. (2) The ratios $\frac{\text{glucose}}{\text{starch}} \times 100$, $\frac{\text{glucose}}{\text{citric acid}} \times 100$, and $\frac{\text{citric acid}}{\text{protein N}} \times 100$ were 70, 38 and 57 respectively, figures which are very low compared with those of other tobacco varieties. Catalase and amylase activity and the content of keto-acids were also studied. It is concluded that the enzyme contents of tobacco leaf tissue, and hence the biosynthesis of the compounds important in technology, are affected by genetic differences and mineral nutrition. The synthesis of citric acid and its relation to the metabolism of sugars is discussed.

772. Miller, C., and Skoog, F.
Regulation of growth in tobacco tissue cultures.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxv.

Callus tissue from the cambial region or from the pith of tobacco stems was cultured aseptically through many transfers. For continued callus growth both IAA and kinetin (6-furfurylaminopurine) were required. With both substances in the medium, continuous proliferation of cells occurred, although they remained small. When only IAA was present, cell division stopped, but the cells enlarged greatly. When only kinetin was present, callus growth stopped, and, especially with the addition of adenine, shoots were formed from the transferred callus.—Dep. Botany, Univ. Wisconsin, Madison.

773. Fardy, A., Cuzin, J., and Schwartz, D.
La nicotinogenèse dans la descendance issue de greffes embryonnaires de *Nicotiana tabacum* L. sur. quelques Solanées. **(Nicotine synthesis in the progeny of embryo grafts of *Nicotiana tabacum* on some other solanaceous plants.)**
Ann. Inst. exp. Tabac. de Bergerac, 1954, (1): 15-22, from abstr. in *Tabacco*, 1955, **59**: 286.

Some workers state that biochemical changes in tobacco grafted on other solanaceous plants are transmissible through the seed and that, for example, some of the sexual progeny of tobacco-tomato grafts have lower nicotine contents than the ungrafted controls. The authors, however, found no differences in nicotine synthesis between the sexual progeny of tobacco-*Datura*, tobacco-*N. glauca* and tobacco-*N. rustica* embryo grafts and those of ungrafted controls. They consider that the functioning of the root meristem is necessary for nicotine synthesis and that the biochemistry of the tobacco scion returns to normal in the progeny or if the scion develops its own roots.

Composition and quality.

(*See also* 8021, n, p, r.)

774. Aksu, S., and Enercan, S.
Türk tütünlerinin kimyasal bileşim karakterleri. **(The chemical composition of Turkish tobaccos. I. The Aegean region.)** [French summary ½ p.]
Tekel Enst. Raporlari, 1954, **6**: 256-61, bibl. 3.

Among Turkish tobaccos the Aegean varieties are in general poorest in nicotine and protein N and the richest in reducing compounds.

775. Wolf, F. A., and Wolf, F. T.
The chemical composition of leaves of diseased tobacco: ring spot, bacterial wilt, and fusarium wilt.
Phytopathology, 1955, **45**: 506-8, bibl. 17.

This report contains the results of analyses for total nitrogen, protein nitrogen, total sugars and petroleum ether extract of comparable samples of diseased and healthy leaves of flue-cured tobacco. Ring spot results in a significant increase in the nitrogen fraction and a significant decrease in total sugars. Leaves from plants with bacterial wilt contain significantly greater amounts of total nitrogen and of petroleum ether extract and significantly smaller amounts of sugars than do those from healthy plants. Fusarium wilt results in a significant decrease in sugars and a significant increase in petroleum ether extract. The effects of these 3 diseases upon the relative amounts of these constituents are consistent with the deleterious effects of the diseases on the quality of the crop. [Authors' summary.]—Dep. Bot., Duke Univ., Durham, N.C.

776. Cundiff, R. H., and Markunas, P. C.
Determination of nicotine, nornicotine, and total alkaloids in tobacco.
Analyt. Chem., 1955, **27**: 1650-3, bibl. 22.

An outline is given of a simplified analytical procedure which involves the extraction of an alkaline tobacco mixture with benzene-chloroform solution and the titration of aliquots of the extract with standard perchloric acid.—R. J. Reynolds Tobacco Co., Winston-Salem, N.C.

777. Byerrum, R. U., and others.
Serine and formaldehyde as metabolic precursors for the nicotine *N*-methyl group.
J. biol. Chem., 1955, **216**: 371-8, bibl. 27.

The β-carbon of serine and formaldehyde, administered in low concentrations in nutrient solutions, were absorbed by *Nicotiana rustica* plants without any adverse effects on growth or appearance. Both compounds were incorporated into the *N*-methyl group of nicotine in the plants' metabolism. Three to four nicotine methyl groups were formed from formaldehyde for each one formed from the serine. These results are discussed with regard to the mechanism of synthesis of the *N*-methyl group of nicotine.

778. Jeffrey, R. N., and Tso, T. C.
Qualitative differences in the alkaloid fraction of cured tobaccos.
J. agric. Food Chem., 1955, **3**: 680-2, bibl. 9.

Alkaloid analyses were made on samples of cured leaf of commercial types of tobacco grown in the U.S. In certain samples, in which nornicotine was the principal alkaloid, more myosmine was found than in samples in which nicotine predominated. No evidence was found of a consistent difference in the proportion of individual nicotine-type alkaloids which could be related to tobacco type.—U.S. Dep. Agric., Beltsville, Md., and Univ. Md., College Park.

779. Anon.
Produire des tabacs légers. De quelques facteurs qui ont une influence sur la teneur en nicotine des feuilles de tabac. **(The production of light tobaccos. Some factors affecting the nicotine content of leaf.)**
Rev. int. Tabacs, 1955, **30**: 127-8.

According to a report issued by the Centre de Tabacs S.O.T.A. at Mont-Calme, Lausanne, the nicotine contents of the tobacco varieties grown in Switzerland vary widely according to climatic and cultural factors, those of Burley and Paesana, for example, ranging from 1·2 to 4·0% and 2·5 to 5·0% respectively. The content is higher in dry, sunny years, in topped plants especially when topping is low or early, and in leaf harvested when over-mature. It can be kept down by sprinkler irrigation in dry weather, by late, high topping, and by harvesting at the beginning of technical maturity.

780. Shiroya, M., Shiroya, T., and Hattori, S.
Studies on the browning and blackening of plant tissues. IV. Chlorogenic acid in the leaves of *Nicotiana tabacum*.
Physiol. Plant., 1955, **8**: 594-605, bibl. 13, illus.

The presence of three phenolic substances, chlorogenic acid, caffeic acid and rutin, was confirmed in the leaves of tobacco by paper chromatography. Rutin was also isolated quantitatively. A polyphenoloxidase present in the leaves was able to provoke a dark brown colour when it attacked chlorogenic and caffeic acid, but rutin was not oxidized. In tobacco leaves in which blackening was pronounced the content of the reduced form of ascorbic acid was low and *vice versa*. [From authors' summary.]—Univ. Tokyo.

781. Aksu, S., and Enercan, S.
Türk tütünlerinin ve harmanlarinin arsenik muhtevalari. **(Arsenic contents of Turkish tobaccos and cigarette blends.)** [English summary 1 p.]
Tekel Enst. Raporlari, 1954, **6**: 295-9, bibl. 10.

The As_2O_3 content of 14 tobacco samples of different origin in 1949/50 varied from 0·1–0·7 p.p.m. in cigarette tobacco, from 0·4–0·5 in pipe tobacco and from 1·2–3·2 p.p.m. in cigar tobacco. The method of analysis used is detailed in the English summary.

Diseases and pests.

(*See also* 457, 523p, 802g, s, v.)

782. LABORATOIRE DE PHYTOPATHOLOGIE DE KANIAMA
La lutte contre quelques ennemis du tabac au Lomami. (**Control of some diseases and pests of tobacco at Lomami.**)
Rapp. annu. Exercice 1953-1954 Lab. Phytopath. Kaniama, reprinted in *Bull. Inf. INEAC*, 1955, **4**: 259-78.

Leafspot diseases (*Cercospora nicotianae*, *Alternaria longipes* and *Pseudomonas tabaci*): 12·5% copper oxychloride in tobacco dust and 50% dichlone in tobacco dust, both at 20 kg. per ha., gave the best control on Sumatra tobacco, namely 51-54 spots per 100 leaves compared with 107 in the control. Cuprous oxide caused leaf burn. On Havana tobacco 12·5% cuprous oxide in tobacco dust at 20 kg. per ha. and 0·5% copper oxychloride at 50 l. per ha. gave the best results, namely 67-73 spots per 100 leaves compared with 199 in the control. Sumatra varieties were the most resistant, while Virginia, Havana and Java varieties showed similar susceptibility. Yellow Mammoth showed good resistance but American Havana was very susceptible. *Root knot nematodes*: The 3 most efficacious treatments were DD, EDB and burning straw and brushwood. *Aphids*: 9% parathion in tobacco dust at 30 kg. per ha. gave the best control of *Myzus persicae*. *Termites*. In a nursery trial dieldrin gave the highest percentage of uninfested plants, namely 72 compared with 60 in the control, and the highest plot yield, 794 kg. per ha. compared with 685 in the control.

783. DAVID, D. J., WARK, D. C., AND MANDRYK, M.
Lead toxicity in tobacco resembles an early symptom of frenching.
J. Aust. Inst. agric. Sci., 1955, **21**: 182-5, bibl. 7, illus.

Spectrochemical analysis of the epigeal portions of 6 tobacco plant samples for 15 elements showed that there were large differences in Pb concentration between severely frenched and healthy plants. Pb treatment of sand-cultured plants resulted in mild frenching symptoms. It is suggested that Pb toxicity may be a contributory factor in frenching.—C.S.I.R.O., Canberra.

784. COLE, J. S.
Tobacco anthracnose.
Rhod. Tobacco, 1955, No. 9, pp. 4-5, illus.

Tobacco anthracnose, caused by *Colletotrichum tabacum*, first appeared in Southern Rhodesia in 1953. Preliminary control trials in 1954 confirmed the effectiveness of zineb, which had earlier been reported the most promising fungicide in Northern Rhodesia. Suggested control measures are the incorporation of 8 oz. 65% or 6·5 oz. 80% zineb with the fertilizer applied to a 30 sq. yd. seedbed, followed by spraying shortly after germination and thereafter twice-weekly with 1½ lb. 65% or 1¼ lb. 80% zineb per 100 gal. water. Initially 1 gal. per bed should give adequate coverage. If control is inadequate, a double-strength spray may be used.

785. MATHRANI, D. I., AND ELIAS, N. A.
Preliminary trials for control of powdery mildew (ash disease) of tobacco.
Indian Tobacco, 1955, **5**: 131-2, bibl. 2, illus.

Preliminary field trials on the F.C.V. (Chatham) and Lanka varieties in 1954-55 showed that powdery mildew (*Erysiphe cichoracearum*) can be effectively controlled by soil applications of sulphur dust at 40 lb. per acre 6-7 weeks after planting.—Centr. Tob. Res. Inst., Rajahmundry.

786. WOLF, F. T., AND WOLF, F. A.
Toxicity as a factor in tobacco black shank.
J. Elisha Mitchell sci. Soc., 1954, **70**: 244-5, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-106.

Wilting of tomato or tobacco leaves is induced by culture filtrates (in widely varying dilutions) from *Phytophthora parasitica* var. *nicotiana* when the fungus is cultivated in either a tobacco-sap or a synthetic starch-glutamic acid medium, but not when it is cultivated in oatmeal or soya-bean broth. Test leaves show wilting when placed in water after short contact with the ground tissue of diseased plants. The toxin can be absorbed by active C and is stable for a limited time in boiling water, non-volatile and dialysable; attempts at its classification are recorded.

787. WOLF, F. A., AND WOLF, F. T.
Carbohydrate and nitrogen metabolism of black shank-affected tobacco.
J. Elisha Mitchell sci. Soc., 1954, **70**: 264-9, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-106.

In comparison with field-grown healthy mature leaves, the diseased leaves contain considerably less total sugar, and either more or less total N, according to whether the leaves are wilted green or wilted yellow, respectively. Similar metabolic disturbances are observed for immature greenhouse-grown leaves. In the latter leaves, the proportion of soluble N to proteins is considerably higher in diseased than in healthy leaves. The results are discussed in relation to previous observations on the changes in respiration and transpiration induced by the disease.

788. SCHRAMM, R. J., JR., AND WOLF, F. T.
Transpiration of black shank-infected tobacco.
J. Elisha Mitchell sci. Soc., 1954, **70**: 255-61, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-106.

Transpiration is increasingly inhibited with the progress of the disease. Experimental evidence is presented, which indicates that contributory factors are reduction in water-uptake, due to damaged roots and to occlusion of the vessels at the base of the stem, and the production of a toxin.

789. WOLF, F. T., AND SCHRAMM, R. J., JR.
Respiration of tobacco black shank tissues.
J. Elisha Mitchell sci. Soc., 1954, **70**: 261-3, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-106.

Infected parts of the pith of tobacco plants respire more rapidly (especially during the initial stages of infection) than do non-infected parts. The possibility that the respiration of the fungus is a contributory factor and the probable nature of the mechanism of the damage caused are discussed.

790. Sasser, J. N., Lucas, G. B., and Powers, H. R., Jr.
The relationship of root-knot nematodes to black-shank resistance in tobacco.
Phytopathology, 1955, **45**: 459-61, bibl. 3, illus.

In greenhouse experiments plants of 2 varieties of black-shank-resistant tobacco were grown in steamed soil to which *Phytophthora parasitica* var. *nicotianae* and *Meloidogyne* spp. were added alone and in combination. Those plants inoculated with the black-shank fungus in the presence of root-knot nematodes developed black-shank symptoms earlier, and to a greater extent, than did plants grown in soil infested with only the black-shank fungus. The role of the nematodes appears to be more than the wounding of root tissues alone, since plants, whose roots were cut and inoculated immediately or at later intervals with the fungus, showed no greater incidence of black shank than uninjured, inoculated plants. These experiments indicate that until nematode-resistant tobacco varieties are available it will be advisable to control root knot either by soil fumigation or crop rotation in fields where the black-shank fungus also is present. [From authors' summary.]—N.C. St. Coll., Raleigh.

791. Kerr, W. E.
Handling and testing crop and vegetable seed in S. Rhodesia.
Rhod. agric. J., 1955, **52**: 293-301.

Subjects discussed include the viability of seed imported into Southern Rhodesia via the tropics, with special reference to lettuce, and an investigation on the treatment of tobacco seed with 1% silver nitrate solution against *Pseudomonas tabacum* and *P. angulata*. Tobacco seed should not be treated before storage. The present practice of rinsing seed after treatment is unnecessary.

792. Kandaswami, M., and Rao, P. G.
Experiments on the control of damping-off in tobacco nurseries.
Madras agric. J., 1955, **42**: 223-8, bibl. 8.

In nursery experiments on the control of *Pythium aphanidermatum* in soils sterilization by burning material on the surface was beneficial in 3 out of 4 cases and 1% bordeaux mixture was the best of 3 fungicides used.

793. Cawthron Institute.
Tobacco research. Disease investigations.
A.R. Cawthron Inst., 1954-55, pp. 34-5.

Under seedling-bed conditions dithane and chloro-bromo-propene (emulsified) gave very effective control of black root-rot (*Thielaviopsis basicola*).

794. Legge, J. B.
Insect control. Treatments suggested for the 1955-56 season.
Rhod. Tobacco, 1955, No. 10, pp. 16-17.

Suggestions are given for the control of (1) leaf-cutting insects and aphids in the nursery, and (2) soil pests, grasshoppers, crickets, cutworms, aphids, whiteflies and budworms in the field.—Tob. Res. Bd, Rhodesia and Nyasaland.

795. Bünzli, G. H., and Büttiker, W. W.
The control of tobacco cricket (*Brachytrupes membranaceus* Drury) in Southern Rhodesia.
Acta trop., 1955, **12**: 252-60, bibl. 20, illus.

The cricket *Brachytrupes membranaceus* has assumed the status of a major tobacco pest in Southern Rhodesia. Experiments on its control, carried out during the period 1948-52, showed that in the off-season expensive fumigants as well as suspensions and emulsions of insecticides can be successfully replaced by dusts of chlordane, BHC, parathion and DDT. Other methods of control, such as treating the burrows with calcium cyanide gas, and baiting or digging out the crickets by hand, are also discussed, and a list of predators and parasites is presented.

796. McClanahan, R. J., and Manson, G. F.
Hornworms on tobacco in southwestern Ontario.
Rev. int. Tabacs, 1955, **30**: 12.

The use of DDT instead of arsenicals and cryolite since 1947 has permitted the increase of the DDT—resistant tobacco hornworm, *Protoparce sexta*, while controlling the tomato hornworm, *P. quinquemaculata*, which is also a pest of tobacco. The growing use of DDT in areas of mixed infestation may alter the situation [see also *H.A.*, 25: 4123e].

797. Esin, T.
Thrips tabaci Lind. haşeresine karşi bazi insektisidlerle yapilan ön deneme. **(The results of experiments with dieldrin 50% wettable powder and Basudin [diazinon] emulsion against *Thrips tabaci*.)** [English summary ½ p.]
Tekel Enst. Raporlari, 1954, **6**: 347-53, bibl. 4.

Both gave good field control but diazinon had little residual effect.

798. Trought, T. E. T.
Preliminary tobacco eelworm investigations in Uganda.
E. Afr. agric. J., 1955, **21**: 28-31, bibl. 2.

Tobacco seedlings of the variety Heavy Western were transplanted from unfumigated beds into unfumigated and fumigated sites and from fumigated beds into unfumigated and fumigated sites. Fumigation was with DD at 9 in. depth and 6 c.c. per injection. Injections were made in the nursery at a spacing of 12 × 12 in., and in the field in 3 positions 8 in. from each planting site and equidistant from one another. The mean rates of attack by *Meloidogyne spp.* at harvest were 94, 86, 76 and 65% respectively with the 4 treatments and the mean yields per plot of 784 plants were 37, 45, 66 and 65 lb. respectively.—Dep. Agric., Uganda.

799. Drolsom, P. N., and Moore, E. L.
The interaction of certain tobacco varieties and plant parasitic nematodes.
Plant Dis. Reptr, 1955, **39**: 703-4, bibl. 4.

Pratylenchus spp. and *Tylenchorhynchus claytoni* cause severe stunting of Dixie Bright 101 plants. The relatively low number of the former necessary to cause stunting indicates extreme sensitivity, which is probably a limiting factor in population build up. Although low numbers of *T. claytoni* also caused stunting, this nematode appeared to multiply just as well on Dixie Bright 101 as on other varieties. The old-established varieties have undoubtedly been grown and selected on nematode-infested soil over a long period of time, and have apparently built up a tolerance to certain parasitic nematodes which is not present in this newer variety.—N. Carolina St. Coll., Raleigh.

Curing and fermentation.

(*See also* 802i.)

800. Anon.
La confection des guirlandes de tabac. **(Stringing tobacco leaves.)**
Rev. int. Tabacs, 1955, **30**: 135.

A note on a new, electrically-operated, French machine, which can string tobacco leaves together for curing at a rate of 4,000 leaves an hour.

801. Bartolucci, A.
La misura telecronografica delle variazioni di umidità assoluta nelle balle di tabacco in fermentazione. **(The measurement of variations in absolute moisture in bales of tobacco during fermentation.)** [English summary 1p.]
Tabacco, 1955, **59**: 291-308, bibl. 2, illus.

A description is given of equipment designed to record chronologically the variations in moisture in oriental tobacco bales during fermentation. The only sample necessary is that taken to determine the humidity before treatment. The results of experiments are given.

Noted.

802.

a Anon.
Aspects de la culture du tabac à Madagascar. **(Aspects of tobacco growing in Madagascar.)**
Rev. int. Tabacs, 1955, **30**: 123, 125, illus.

b Anon.
For better and easier sorting of tobacco use proper light.
Ext. Folder N.C. agric. Exp. Stat. **117**, 1955, 1 folded sheet, illus.
Advice on the use of fluorescent lighting.

c Anon.
La culture du tabac en Grèce. **(Tobacco growing in Greece.)**
Rev. int. Tabacs, 1955, **30**: 61-5.

d Anon.
Les tabacs turcs. **(The Turkish tobaccos.)**
Rev. franç., reprinted in *Rev. int. Tabacs*, 1955, **30**: 27, 29-32, illus.
Notes on the industry and the Tobacco Institute near Istanbul.

e Anon.
Management of cheroot and chewing tobacco nurseries.
Indian Tobacco, 1955, **5**: 141-3, illus.
Advisory notes.

f Balcar, J.
Biologický stav půd v tabákových oblastech. **(The biological status of soils in tobacco areas.)**
Sborn. čsl. Akad. zeměd. Věd. Rostl. Výroba,* 1955, **28**: 228-31, bibl. 6.
Including cultural methods for improving soil structure.

g Bawden, F. C., and Kleczkowski, A.
Studies on the ability of light to counteract the inactivating action of ultraviolet radiation on plant viruses.
J. gen. Microbiol., 1955, **13**: 370-82, bibl. 17.
Including 3 tobacco viruses.

h Central Tobacco Research, Rajahmundry.
Chatham, a new variety of cigarette tobacco.
Indian Tobacco, 1955, **5**: 97, illus.

i Central Tobacco Research Institute, Rajahmundry.
Curing of Virginia and Lanka tobaccos.
Indian Tobacco, 1955, **5**: 99-104, illus.
Advice on flue-curing Virginia and air-curing Lanka.

j Central Tobacco Research Institute, Rajahmundry.
Topping Virginia tobacco.
Indian Tobacco, 1955, **5**: 93-4, illus.
Recommendations for Northern Circars.

k Elgin, N.
Nicotiana tabacum L. (Izmir çeşidi no. 64) ün anatomik vasiflari. II. Kök. **(The anatomy of *Nicotiana tabacum* variety Izmir 64. II. The root.)** [French summary ½ p.]
Tekel Enst. Raporlari, 1954, **6**: 262-70, bibl. 4, illus.
Part I noted in *H.A.*, 24: 1697g.

l Khanolkar, V. R., Panse, T. B., and Divekar, V. D.
γ-Sitosteryl glycoside in tobacco.
Science, 1955, **122**: 515-16, bibl. 8.
In an Indian chewing tobacco.

m Neas, I.
Weather factors in relation to tobacco production.
Rhod. Tobacco, 1955, No. 10, pp. 10-11.
North American and Rhodesian conditions compared.

n Paleg, L. G.
The biosynthesis and role of hormones in the fruit development of tobacco.
Diss. Abstr., 1955, **15**: 953-4, being *Publ.* 12117 of 88 pp.

---

* Formerly *Sborn. čsl. Akad. zeměd Věd, Ser. A.*

o PATEL, M. S.
Tobacco production and industry in India.
Indian Tobacco, 1955, **5**: 69-80, illus.
Acreage, production, localities, types, products, consumption and exports.

p PHILLIPS, M.
The isolation of chlorogenic acid from American flue-cured tobacco, U.S. type 12.
J. Ass. off. agric. Chem. Wash., 1955, **38**: 835-7, bibl. 13.

q RAEBER, J. G., AND BOLTON, A.
A new form of male sterility in *Nicotiana tabacum* L.
Nature, 1955, **176**: 314-15, bibl. 1, illus.
Spontaneous occurrence of petalody of the stamens.

r RESNIK, F. E., LEE, L. A., AND POWELL, W. A.
Chromatography of organic acids in cured tobacco.
Analyt. Chem., 1955, **27**: 928-31, bibl. 16.

s SCOTT, L. B.
Corn root webworm ceases to be a pest of tobacco in Tennessee.
J. econ. Ent., 1955, **48**: 328, bibl. 1.
Absence of *Crambus caliginosellus* injury due to weed destruction.

t STINSON, F. A.
Tobacco farmers in Southern Rhodesia profit by research.
Foreign Agric., 1955, **19**: 75-9, illus.
Activities and achievements of the Tobacco Research Board.

u WOLF, F. A., AND WOLF, F. T.
The chlorophyll content of certain flue-cured and Turkish tobacco varieties.
Agron. J., 1955, **47**: 351-3, bibl. 7.

v WOOLLEY, D. W., SCHAFFNER, G., AND BRAUN, A. C.
Studies on the structure of the phytopathogenic toxin of *Pseudomonas tabaci*.
J. biol. Chem., 1955, **215**: 485-93, bibl. 9.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS

Culinary and spice plants.

(*see also* 29, 527, 819, 865b, v, 1130, 1131.)

803. ABRAHAM, P.
Now, better possibilities with cardamom.
Indian Fmg, 1955, **5**(5): 9-14, illus.

Subjects covered include types of *Elettaria cardamom*, pests, *Pythium* clump rot, propagation by seed, preparation of land for planting, spacing, planting, crop management and economics.

804. PUTTARUDRIAH, M.
An epidemic outbreak of cardamom hairy caterpillar.
Indian Coffee, 1955, **19**: 151-6, illus.

Control of *Eupterote canaraica* has been obtained by (1) handpicking the caterpillars in August/September; (2) spraying with 1 lb. Hongeoil resin soap in 10 gal. water, 1 lb. 50% DDT wettable powder in 16 gal. water or 0·1% Folidol E.605, or dusting with 1·5% Folidol dust; and (3) destruction of the pupae from December to June.

805. ANDRIES, E.
L'évolution de la culture de la chicorée à café, en Belgique. Les importations et les exportations de cossettes et de chicorée. **(The evolution of chicory root culture in Belgium. Imports and exports of dry chicory roots and ground chicory.)** [English and German summaries 6 lines each.]
Rev. Agric. Brux., 1955, **8**: 1298-330, bibl. 10.

In Belgium, where chicory growing was started in the 18th century, the main areas of cultivation are Flanders and Hainaut. The economic importance of the crop is analysed, with special reference to the post-war trade with the U.S.A.

806. NAMBIAR, K. K.
How they cultivate pepper.
Indian Fmg., 1955, **5**(7): 27-32, illus.

Notes are given on the ecological requirements of *Piper nigrum*, and on varieties, propagation by cuttings, planting, cultural practices, manuring, pests, diseases, harvesting, yield and costs in India.

807. GENTRY, H. S.
Introducing black pepper into America.
Econ. Bot., 1955, **9**: 256-68, bibl. 13, illus.

Owing to the decline of pepper culture in southern Asia the U.S. Department of Agriculture has become interested in establishing pepper as a commercial crop in tropical America. The first successful introduction of clones of commercial varieties of black pepper was made in 1953. Cuttings of the varieties Balamcotta and Kalluvalli from the Malabar Coast of India were established at the Federal Plant Introduction Garden, Glenn Dale, Md, from whence material was sent to Mayaguez, P.R., for trial, further multiplication and distribution. The following year 8 further varieties were introduced. Notes are here given on the characteristics of these varieties together with observations on pepper culture in India and the possibility of its culture in the Americas.

808. CREECH, J. L.
Propagation of black pepper.
Econ. Bot., 1955, **9**: 233-42, bibl. 1, illus.
Black pepper comes west.
Agric. Res. Wash., 1955, **4**(1) : 14, illus.

An account is given of methods of propagating black pepper tested at the U.S. Plant Introduction Garden, Glenn Dale, Md. The traditional Indian method of using semi-hardwood cuttings with 3-4 nodes resulted in only about 15% rooting after 6 months. The use of single node cuttings rooted in a closed propagating case with low light intensity and high humidity resulted in 88% rooting in 7-14 days. In order to reduce the time lag required for the stock plants to reach sufficient size to produce enough cuttings, a method was developed of encouraging the roots which developed spontaneously at the nodes on the parent vine. Each vine was trained up a bamboo pole covered with damp sphagnum moss, the moss being occasionally syringed with liquid fertilizer. By the time the plants reached the top of the poles each prospective nodal cutting was heavily rooted into the moss. The vines were then cut back to 3 leaves and the rooted cuttings separated, removed from the moss and potted in soil in a shaded house. Potting was 94% successful and development was rapid. New leaders developed on the stock plants from which further cuttings could be taken. Although the method was designed to meet initial demand where a limited amount of stock was available, it could also be used in a field programme. The second paper gives a short account of the same procedure.

809. Richards, A. V.
Betel and pepper.
A.R. Ceylon Dir. Agric. 1954, 1955, p. 59.
Vegetative propagation of betel and pepper vine.
Trop. Agriculturist, 1955, **111**: 12-17, bibl. 2.

In trials with different rooting media both single-leaf and stem cuttings of betel produced significantly more roots in a medium of coir dust and fibre than in sand or soil, and more shoots in soil than in sand. Stem cuttings produced more roots and shoots than single-leaf cuttings in all the media tested. Pepper cuttings also produced more roots and shoots in coir dust and fibre than in sand or soil, but, unlike the betel cuttings, single-leaf cuttings gave better results than stem cuttings.

810. Fagen, H. J., Kolen, E. P., and Hussong, R. V.
Spectrophotometric method for determining piperine in oleoresins of black pepper.
J. agric. Food Chem., 1955, **3**: 860-2, bibl. 9.

The ultraviolet absorption of an oleoresin of black pepper in chloroform was found to be identical with that of pure piperine in chloroform.—Kraft Foods Co. Res. Lab., Glenview, Ill.

811. Lugo Lugo, H.
Studies on the germination of *Vanilla planifolia*.
Diss Abstr., 1955, **15**: 952-3, being *Publ.* 9762 of 130 pp.
The effect of nitrogen on the germination of *Vanilla planifolia*.
Amer. J. Bot., 1955, **42**: 679-84, bibl. 9, illus.

Sterilized seeds of *Vanilla planifolia* were cultured on Knudson's Solution B. The number of seeds which germinated increased when solution B was diluted with distilled water, the highest germination, 64%, occurring when the concentration was reduced to one-tenth of the normal. At the higher concentrations the N content of the culture medium was the critical factor for germination. The greatest number of seeds germinated when the N concentration was close to zero. Nitrate-N caused greater, and urea less, germination inhibition than ammonium. Sugar, normal atmospheric pressure, a temperature of 32° C. and darkness were essential for germination. The pH of the medium did not appear to be a critical factor. No germination inhibitors were found in water extracts of embryos and whole ungerminated seeds, but germination was inhibited by 95% ethanol extracts of embryos and whole seeds, and by pre-treatment with alcohol. Seed treatment with 3% hydrogen peroxide for 24 hours before sowing increased the germination percentage. Sowing such seed on a solution B medium with one-thousandth normal N concentration gave the greatest increase in germination. Pre-treatment with various concentrations of thiourea and the addition of vitamins and indoleacetic acid to the medium produced no striking differences in germination. Ethyl vanillate and to some extent vanillin inhibited germination. Complete germination inhibition resulted from seed treatment with varying concentrations of ether, chloroform, or ethylene chlorohydrin vapours.

812. Theis, T., and Jiménez, F. A.
Vanilla chemotherapeutants for root rot control.
A.R.P.R. fed. exp. Stat., Mayagüez, 1953, 1953, p. 11.

2-Norcamphane methanol gave a significant reduction in root rot disease when applied to 2-node, rooted cuttings of *Vanilla planifolia* at 63 p.p.m. and higher concentrations. The solution was applied twice weekly, beginning a fortnight before inoculation. 4-Chloro-3,5-dimethylphenoxyethanol at 15-250 p.p.m. gave no control and caused root injury at the highest concentration.

Drug plants.

(*See also* 78, 865a, d, e, g-i, l, m, t, x, 1129.)

813. Sawyer, W. H.
Bahamian medicine.
Sci. Mon., 1955, **80**: 371, from abstr. in *Econ. Bot.*, 1955, **9**: 304.

Forty medicinal plants native to Inagua are listed, with common and scientific names, preparation and dosage.

814. Webb, L. J.
A preliminary phytochemical survey of Papua-New Guinea.
Pacific Sci., 1955, **9**: 430-41, bibl. 10.

A summary is given of the results of tests for alkaloids, saponins and polycyclic compounds made on some 300 plants of 185 genera collected in Papua-New Guinea in 1951.

815. Loustalot, A. J., and Pagán, C.
Local "fever" plants tested for presence of alkaloids.
El Crisol, 1949, **3**(5): 3-5, bibl. 2 [received 1955].

Twenty-two plants used locally against fevers were tested for the presence of alkaloids. Nine showed positive reactions but in no case was quinine or quinidine present. The two plants which showed the strongest positive reactions were *Exostema sanctae-luciae* and *Waltheria americana*.

816. Chaudhri, I. I.
Pakistan santonica.
Econ. Bot., 1955, **9**: 224-7, bibl. 3, illus.

Pakistan has recently become the largest santonin-producing country in the world with an annual production of over 1,000 tons. This anthelmintic drug is extracted from the perennial herb *Artemisia maritima*. In the Gilgit Agency the drug is obtained from wild stands of the plant, the tips of the branches being plucked in the leaf stage when the percentage of santonin varies from 1·0 to 1·5. In the Kurram Valley, however, *A. maritima* is cultivated on the "bunds" of fields or on ridges between other crops. The plants are cut when in the unopened floral bud stage and brought to a collecting centre where they are threshed and sieved and the product is graded by the Agriculture Department. The santonin percentage varies in grade A from 1·5 to 2·5 and in grade B from 0·8 to 1·5. As a result of selfing experiments carried out by the Agriculture Department a number of high santonin-containing strains have been evolved, of which B-3 and B-9 have been found to contain 3·17% and 4·24% of santonin respectively.

817. TOMOVA, M.
On the dynamics of santonin accumulation in *Artemisia maritima* var. *salina*. [Bulgarian, with Russian and German summaries 1 p. each.]
Izv. bot. Inst. Sofia, 1955, **4**: 277-92, bibl. 9.

Results of 3-year's studies have shown that santonin accumulation in *A. maritima* var. *salina* proceeds throughout nearly the whole growing period, reaching its maximum just before flowering. The santonin content was found to vary with environment and areas in which the plants produce the highest santonin contents of 2·0-2·87% are mentioned. Studies of soils for *Artemisia* cultivation have been started.

818. LIEM SENG GO, AND HEGNAUER, R.
Pharmocognostische onderzoekingen met zeven vormen van *Datura stramonium*. **(Pharmocognostical experiments with 7 varieties of *Datura stramonium*.)**
Pharm. Wbl., 1955, **90**(15): 513-19, from abstr. in *Trop. Abstr.*, 1955, **10**, No. c2232.

The seven varieties were analysed for their alkaloid content and hyoscine percentage. No clear varietal differences were observed.

819. DEVJATNIN, V. A., AND OBODOVSKAJA, D. A.
The sea buckthorn. [Russian.]
Priroda, 1955, **44**(9): 101-2, illus.

The fruit of *Hippophae rhamnoides*, containing fat, vitamin C, B_1, B_2, B_c, E and carotene, provides a promising medicinal raw material and is also used for culinary purposes.

820. DUBOIS, L.
Tabernanthe iboga Baillon. **(*Tabernanthe iboga*.)** [Flemish summary 2¾ pp.]
Bull. agric. Congo belge, 1955, **46**: 805-29, bibl. 35, illus.

Tabernanthe iboga and 5 other species of *Tabernanthe* are described botanically. Notes are given on the alkaloid, ibogain, and on its medicinal uses and commercial possibilities.

821. BIEZANKO, C. M.
O tanaceto ou catinga de mulata. (Algumas observações sôbre o *Tanacetum vulgare* Linn., seu cultivo, propriedades e utilidades.) **(Tansy. Some notes on *Tanacetum vulgare*, its culture, properties and uses.)** [English summary 12 lines.]
Bol. Plant. medic. ornam., **5**, 1952, pp. 26, bibl. 22, illus. [received 1955].

A description is given of *Tanacetum vulgare* and of some other plants with which it might be confused. Cultural notes cover light requirements, soil, propagation by seed and plant division, planting and harvesting. The organic compounds present in tansy are briefly discussed.

822. BERTHOLDI, R. E.
O verbasco. (Algumas observações sôbre o *Verbascum virgatum* With., seu cultivo, propriedades e utilidades.) **(Verbascum. Some notes on *Verbascum virgatum*, its culture, properties and uses.)**
Bol. Plant. medic. ornam., **4**, 1949, pp. 38, bibl. 36, illus. [received 1955].

Descriptions are given of *Verbascum virgatum* and 9 other *Verbascum* species. Cultural notes cover soils, propagation by seed sown in nurseries or preferably *in situ*, planting, spacing, maintenance, pests, diseases and flower harvesting.

Essential oils.

(*See also* 117c, 852, 865s.)

823. ELZENGA, G.
Veredelingsproblemen bij *Angelica archangelica*. **(Problems of *Angelica archangelica* selection.)** [English summary 7 lines.]
Meded. Dir. Tuinb., 1955, **18**: 748-52, bibl. 1, illus.

The volatile oil content of the lateral roots of angelica is correlated with that of the main root system. A table is provided by means of which total oil contents can be calculated from samples taken from lateral roots without destroying the plants, which thus remain available for selection purposes. [See also *H.A.*, 24: 4020.]

824. MARSHALL, H. B.
Conifer needle oil.
From abstr. in *Econ. Bot.*, 1955, **9**: 299.

Aromatic oils, suitable for use in the perfumery industry, are present in the needles of spruce and balsam to the extent of about 1%. The annual cut of black spruce in Ontario alone yields enough foliage to furnish about 5 million pounds of black spruce needle oil. The utilization of this oil is being investigated by the Department of Lands and Forests, Ontario, and the Ontario Paper Company.

825. BURGER, A. M.
Lemongrass cultivation in Angola.
Perfum. essent. Oil Rec., 1955, **46** (6): 185-8, illus., from abstr. in *Trop. Abstr.*, 1955, **10**, No. c2002.

Cymbopogon citratus is cultivated commercially in Angola, with yields of 2-6 tons fresh grass and 25-100 kg. oil per ha. The oil has a citral content of 70-82%. Details of its preparation and analysis are given.

826. MENON, A. K.
Ocimum plants.
Bull. Indian centr. Coconut Cttee, 1955, **9**: 25-8, bibl. 11, illus.

The possibilities are discussed of 4 Indian species of *Ocimum* and of *O. kilimandscharicum* for the commercial production of essential oil in India.

827. SCHEUER, P. J.
The constituents of mokihana (*Pelea anisata* Mann).
Chem. Ind. Lond., 1955, No. 40, pp. 1257-8, bibl. 9.

Pelea anisata, an anise-scented tree found exclusively on the island of Kauai, appeared to be particularly attractive to the oriental fruit fly (*Dacus dorsalis*). An analysis of the oil extracted from leaves, twigs and fruits showed that one of the chief constituents was anethole. Anethole has been reported to occur in quantity in only one other member of the Rutaceae.—Univ. Hawaii.

Fibres.

(*See also* 1089, 1258.)

828. COMMONWEALTH ECONOMIC COMMITTEE.
Industrial fibres.
[*Publ.*] *Commonw. econ. Cttee*, 1955, pp. 184, H.M.S.O., Lond., 5s.

This issue gives statistics of world production, trade and consumption for 1938-39 and post-war years from 1949 to 1954. The plant fibres include sisal, manila hemp, henequen, *Phormium*, maguey [*Agave americana*], true hemp, coir and kapok.

829. PORTERFIELD, W. M., JR.
Loofah—the sponge gourd.
Econ. Bot., 1955, **9**: 211-23, bibl. 25, illus.

The loofah, *Luffa cylindrica*, has been cultivated in tropical countries since ancient times. The young fruits of the sweet variety are sometimes used for food but the fruits are mainly important for their fibrous skeletons which are used for oil and water filters, sponges, shock absorbers, sound-proof linings and numerous other industrial purposes. The sap and other parts of the plant are used in some countries in medicinal and toilet preparations. Notes are here given on the history, distribution and cultivation of the plant, its uses, diseases and pests, trade requirements and possibilities of improvement by breeding.

830. FRANQUIN, P.
Notes sur la sensibilité aux sels de la ramie.
Notes et Fibres trop., 1955, **10**(1): 61-71, bibl., illus., from abstr. in *Trop. Abstr.*, 1955, **10**, No. c2499.

Ramie appears to be particularly sensitive to the Cl ion. The Mg ion is less toxic than the Ca ion and considerably less so than the Na ion. Up to a certain point Mg may even be beneficial.

831. MOURANCHE, R.
Le palmier raphia de Madagascar. (**The raphia palm of Madagascar.**)
Bois Forêts trop. 1955, **41**: 8-18, bibl., illus., from abstr. in *Trop. Abstr.*, 1955, **10**, No. c1986.

An account is given of the biology and ecology of *Raphia ruffia*, the chief product of which is raphia fibre obtained from the upper epidermis of the leaflets. Methods are suggested for the improvement and extension of the natural stands of the palm.

832. EAST AFRICAN SISAL INDUSTRY. (LOCK, G. W., AND NICHOLS, A. F.)
Annual Report of the East African Sisal Industry comprising Tanganyika Sisal Growers' Association and Kenya Sisal Growers' Association.
Reports and Accounts for the year ended 31st December 1954 and *Estimates for 1955*, 1955, pp. 84.

Sisal Research Station, Mlingano, Ngomeni, Tanganyika (pp. 35-45). Fifty-five trials are summarized. *Field trials on the station.* Cultivation trial: now 19 years old, this trial shows that yields cannot always be maintained on acid soils solely by the use of vegetal cover between cycles. Two-year grass leys did not suffice by themselves to improve growth and direct application of N to the young sisal rather than through the ley is recommended. Spacing trial: in this trial begun in 1936 soil deterioration is beginning to affect the high density (6,000 or 10,000 per ha.) plots, and in the low density (1666 and 2500) plots 3rd-cycle yields are less than 2nd-cycle and aggregate yields are much lower than for densities of 4000 and upwards. Spacing × cutting trial: yield is affected more by plant population and commencement of cutting than by spacing or cutting cycles; heavy cutting from a normal date reduced yields by 16·5% and heavy cutting begun early caused dwarfing. Grass rotational × manurial trial: the most promising plots are those treated with lime or phosphate during the ley. Factorial manurial trial: over 5½ years N has given the best yield response and lime and phosphate have also increased yields but K has had no effect. Fertilizer placement trial: on the row placement appears to be the best. Mulching trial (5½ years old): 50 tons sisal waste per ha. for the first 2 years has given the best results, closely followed by inorganic fertilizers. Ridging trial: ridged sisal has so far out-yielded that planted on the flat. Interplanting trial: sorghum has significantly reduced fibre yields, but none of the other crops or factors has had any effect. Sisal waste manurial trial: total waste effluent and solid waste only have produced faster growth than liquid waste only. Nitrogen fertilizer trial: calcium nitrate has improved the appearance of the sisal most and potassium nitrate has tended to induce chlorotic mottling. Spraying trials: dieldrin gave good control of *Scyphophorus acupunctatus* in the nursery and results suggest that it should be applied at 2·4 lb. active principle per ha. soon after planting. Permanent bulbil nursery trial: 50 × 25 cm. again resulted in larger plants than 30 × 25, and best growth was made on plots treated with 50 tons old or fresh sisal waste per ha. Bulbil nursery mulching and manurial trial: all mulches were better than none and sisal waste was the best followed by grass and then by paper; Ca and NP gave positive results, but depth of prior cultivation had little effect. *External trials.* Spacing × cutting trial—Morogoro District: yields rose with plant populations, but the difference between 5000 and 6000 per ha. was only ½ ton per ha. Yields were not affected by row spacings or cutting cycles but were reduced slightly by starting cutting late. Banding disease manurial trial—Tanga District: final results were that 1100 lb. potassium sulphate per ha. during the early years raised yields from 12·3 to 19·9 tons per ha. at a cost of Shs 37/67 per ton of extra fibre. *Plant physiology.* Nutrition was studied in sand and water cultures and by leaf analysis. *Soil chemistry*. Deficiency diseases tend to be commoner on acid than on calcareous soils. Data suggest that banding disease is liable to occur with exchangeable K levels of less than 0·3 meq/% in loamy and 0·2 in sandy soil. *Plant Breeding*. Research on *Agave angustifolia* × *A. amaniensis* hybrids continued.

High level Sisal Research Station, Thika, Kenya (p. 52-5). *Nurseries*. In general, spacings should not be less than 2 ft. 9 in. × 2 ft. 9 in. *Planting materials*. In a plant grading trial, plots of ungraded plants were significantly more variable in height than those containing graded plants. Height plus girth grading gave the most uniform stand. In single-factor grading height was better than girth or weight. In a curing period trial plants cured (left lying with or without shade) for 3 months before planting in 1953 have so far produced more leaves than fresh plants. In a planting size trial 21-in. plants were ready for cutting 6–7 months before 9-in. plants, but the total number of leaves produced before a length of 3½ ft. was reached was the same, namely 128–130. After 2 cuts the 21 in. plants had produced about ½ ton more fibre per acre than the 9-in. plants. *Spacing and populations*. A single-row spacing of 11 ft. has so far resulted in faster growth, greater leaf production and larger leaves than one of 14 ft. or a double-row spacing of 18 ft. by 3 ft. Among populations of 1,600, 2,000 and 2,400 at row spacings of 11 and 13 ft., double rows have resulted in slightly more and slightly larger leaves than single rows after 2¾ years, and 11-ft. spacing has produced more leaves than 13-ft. *Cutting*. Starting cutting when the plants have produced 125 leaves appears to be the best for higher altitudes in Kenya. Cutting at 100 leaves retards the natural increase in leaf length but not the total number of leaves grown. Severity of cut, as between 30, 20 and 10 leaves left at each cut had little effect on total number of leaves grown, but the more severe cuts shortened the leaves. *Improvement and maintenance of soil fertility*. In a trial laid down in 1950 lime is giving a small increase in leaf count and gave an increase in leaf length in the earlier years, sisal waste gave increased leaf production and length in the earlier years, N has given brief and P more prolonged increases in leaf production after most applications, and K has had no effect. Grass management experiments involve strip planting between sisal rows. Control of weeds. Experiments with TCA against *Digitaria scalarum* continue.

Gums and mucilage plants.

(*See also* 865o)

833. CHANDLER, C.
Improvement of *Plantago* for mucilage production and growth in the United States.
Contr. Boyce Thompson Inst., 1954, **17**: 495-505, bibl. 9, illus.

The mucilaginous seedcoats of several species of *Plantago* are used in pharmaceutical preparations, in printing and finishing, in setting lotions and as stabilizers in the ice-cream industry. Preliminary tests have shown that *P. ovata*, the most desirable species for mucilage production, can be grown in Arizona. For commercial production in the U.S.A., however, it is necessary to obtain improved types that can be harvested by machine. In 1951 a project was started to improve *Plantago* through selection, hybridization and induction of ploidy. Tetraploidy was induced in 3 species, *P. ovata*, *P. wrightiana* and *P. rhodosperma*. Various types of flower behaviour were observed for these 3 species. Male sterile diploid plants of *P. ovata* were of frequent occurrence. All diploid plants of the 3 species set abundant seed with open pollination. Fertility of tetraploids was slightly less than that of diploids. Seed size, quantity of mucilage and vigour of plants were greater in the tetraploids.

834. CHANDLER, C., AND BARTON, L. V.
Morphological and physiological studies of diploid and tetraploid *Plantago ovata* Forsk.
Contr. Boyce Thompson Inst., 1955, **18**: 193-214, bibl. 14, illus.

Colchicine-induced tetraploid plants of *Plantago ovata*, which exhibit more desirable characteristics than the corresponding diploids for the commercial production of psyllium, have a tendency to produce a dark brown exudate that reaches its maximum as the plants approach maturity. This is associated with a form of leaf injury. Morphological studies revealed that the tetraploids possess broader and thicker leaves composed of larger cells than the diploids. The former are also characterized by larger stomata and broader epidermal hairs. It has been impossible to correlate the appearance of the exudate with mechanical or fumigant injuries; insect or mite feeding; or bacterial, fungus or virus infection. Tetraploid leaves had a higher moisture content and a lower transpiration rate per g. of dry weight than those of the diploid. The osmotic pressure of the cell sap of the tetraploid was consistently lower than that of the diploid. Although the cause of exudate formation in the tetraploids has not been determined with certainty, it may be associated with the water relations of the plants. In general, development of tetraploid plants was delayed as compared with diploids. Details are given of reactions to a deficiency of K, P or N, or an excess of the latter in nutrient solution. Also growth and flowering was observed in the greenhouse in different soil types, with deficient, normal and excessive supplies of water and night temperatures of 5°, 10°, 21° or 30° C. [From authors' summary.]

Hops.

(*See also* 865p, 1070, 1256, 1261.)

835. INSTITUTE OF BREWING HOPS ADVISORY COMMITTEE.
Institute of Brewing hop trials: 1953 crop.
J. Inst. Brew., 1955, **61**: 372-6.

The hops tested were the wilt-tolerant varieties D3, 1147, C2, OT48 and J2. On the basis of total soft-resins content, D3 appeared to be the most satisfactory as a copper hop and it met with some acceptance for dry hopping. J2 was satisfactory on the basis, however, of only a few trials, whilst 1147 provoked some adverse comment, appearing to produce a harsh flavour especially after storage. OT48 found some support though it, too, was thought in some quarters to produce harshness. C2 was not generally liked, and neither this variety nor J2 showed any advantage in resins content over the controls. [From author's summary.]

836. SEELEY, R. C., AND WAIN, R. L.
Studies on plant growth-regulating substances. IX. Investigations with pollen extracts and synthetic growth substances on hop plant (*Humulus lupulus* L.)
Ann. appl. Biol., 1955, **43**: 355-65, bibl. 29, illus.

Application of some growth substances markedly stimulated flowering laterals of the hop plant. The effect was specific to certain compounds and varied between varieties of hops and in the stage of flower development. The initial stimulation was not maintained by repeated application of the chemical, and untreated control laterals yielded a greater weight of cones with a higher soft resin content. Application of hop pollen extracts and a flavonol glycoside obtained from the pollen failed to stimulate early cone development when applied to flowering laterals, whether they were protected from pollination or not. When 2:3:5-triiodobenzoic acid was applied to mature or seedling hop plants, no effect on flowering comparable with that induced in tomato plants was observed, though striking changes in vegetative growth occurred. In similar conditions, α-(2-naphthoxy)-phenylacetic acid was shown to induce no morphogenic effects. [Authors' abstract.]—Wye Coll.

837. BONNET, J., AND COPPENS, R.
L'absorption des éléments nutritifs par le houblon. (**Absorption of nutrient elements by the hop.**)
Bull Inst. agron., Gembloux, 1955, **23**: 248-59.

Data are tabulated showing the percentage of N, P_2O_5, CaO, MgO, K_2O, Na_2O and Mn in plants and cones of several hop varieties at various dates during the 1953 season, and the amount of nutrients absorbed per hectare. The results, confirming previous findings [see *H.A.*, 25: 774], were as follows: (1) Nutrient absorption occurred mainly during the 2 months preceding harvest. (2) Nutrient requirements depended on variety. (3) For all varieties excepting Tettnang Ca was the element absorbed in the largest quantity, followed by K and N; Tettnang, however, absorbed more K than Ca. P_2O_5 absorption was about the same as that of mg. Cone analyses showed that P, N, K and Mg were particularly important for flower development.

838. CAWTHRON INSTITUTE.
Hop research. Chemical investigations. Boron deficiency. Magnesium deficiency.
A.R. Cawthron Inst. 1954-55, pp. 31-2.

Leaf wrinkling and distortion and death of the growing point were induced in leaves of hop plants grown in sand culture without B. In the second season after its application to field plots pandermite raised the B level in the leaves much higher than did corresponding applications of borax. In 1954, dolomite applications were superior to magnesite in correcting Mg deficiency symptoms.

839. CAWTHRON INSTITUTE.
Molybdenum investigations. A. Suspected molybdenum deficiency in hops.
A.R. Cawthron Inst. 1954-1955, pp. 16-17.

A low level of Mo in hop leaves (0·02 p.p.m.) was associated with a leaf disorder leading to lamina breakdown. Sodium molybdate, at 8 oz. per acre, was applied in the spring and increased leaf Mo content 3- or 4-fold. Ground limestone applications increased leaf Mo content to a lesser extent.

840. CAWTHRON INSTITUTE.
Mineral composition of hop cones.
A.R. Cawthron Inst. 1954-55, pp. 18-19.

Samples of hop cones were analysed at different stages of maturity for their mineral content. The soluble ash content decreased from 10·6% at the burr stages to 7·4% 21 days later, but increased again to reach 8·7% at full maturity. Insoluble ash content was 1·6% at maturity. K_2O remained at about 3·0%. CaO varied between 1·3 and 1·7%. P_2O_5 decreased from 1·54% at flowering to about 0·8% in the latter half of the sampling period. MgO remained at about 0·6%. N was high in the young cones (5%), but fell rapidly to 2·9%, rising again to 3·1% at maturity. It was apparent that nutrient uptake, particularly of N and K_2O, was very rapid between the eighth and thirteenth days from burring.

841. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, PARIS (I.N.R.A.).
Houblon. (**Hops.**)
A.R. Inst. nat. Rech. agron. 1952, 1955, pp. 112.

Research at the Dijon Plant Breeding Station showed that the cones in the lower part of the hop plant have a higher resin (and moisture) content than those in the upper part and that approximately 68% of the alpha resins and 88% of the beta resins are already present 15 days before the cones reach maturity.

842. BISHOP, L. R.
Comparative studies of methods of hop analysis. I. Estimation of moisture content.
J. Inst. Brew., 1955, **61**: 386-93.

Collaborative studies of methods for measuring the moisture content of hops have shown that each of the methods is liable to errors which can be so serious that, unless suitable precautions are taken, the results are worthless. Five methods namely, vacuum desiccator, distillation entrainment, Fischer method, ovens at 106° C., and ovens at 98° C., were compared, and suggestions are made on procedures for 4 of them which would minimize errors.—Stag Brewery, Pimlico, London, S.W.1.

843. VERZELE, M., AND GOVAERT, F.
Analysis of the "humulone complex" by a chromatographic partition procedure.
[French and Spanish summaries ½ p. each.]
Wallerstein Lab. Commun., 1955, **18**: 181-90, bibl. 8.

A chromatographic procedure employing a silica-gel column is described which makes easier the determination of the "humulone complex" of hops and separation of its chief constituents, namely, adhumulone, humulone and cohumulone. (From authors' conclusion.]—Lab. Chim. org. Univ. Gand, Belgium.

844. TATCHELL, A. R.
Studies on the hope cone. I. Hop deterioration.
J. Inst. Brew., 1955, **61**: 412-19, bibl. 15.

The factors causing deterioration of hops during storage have been considerably clarified. Thus it has been shown that deterioration of the α-soft resin almost ceases when the hops are stored in the absence of oxygen; furthermore, conditions of low relative humidity retard deterioration. The dependence of deterioration on hop variety is maintained under all the storage conditions examined. It is concluded that deterioration is an oxidation process and need not normally be influenced by micro-organisms. [Author's summary.]—Dep. Hop Res., Wye Coll.

Insecticidal plants.

(*See also* 865j, q, r.)

845. Anon.
Nursery technique in the production of derris planting material.
Suppl. A.R. Zanzibar Dep. Agric. 1954, 1955, pp. 7-8.

Three trials are reported. The best results were obtained from using hardwood cuttings, planted immediately after removal from the vine and set deep in the nursery bed. Little advantage resulted from treating the cuttings with a rooting preparation or from planting in heavily composted beds.

846. Anon.
Comment cultiver le pyrèthre. (**Pyrethrum culture.**)
Bull. Inf. INEAC, 1955, **4**:303-8.

Information is given on choice and preparation of site, nursery practice, planting, maintenance including *Ramularia* control, harvesting, yields and drying.—Stat. Rech. agron., Mulungu.

847. Kroll, U.
Mechanization of pyrethrum.
Pap. Conf. Mech. Agric. Uganda, **6**, 1955, from abstr. in *Agric. hort. Engng. Abstr.*, 1955, **6**, No. 1068.

Mechanization of planting, cultivation, picking and drying of pyrethrum in Kenya is reviewed and an indication of costs for the first two operations is given. Designs are being completed for interplant weeders and a number of picking devices. A picking machine which is selective, in so far that it will not strip buds, would be desirable; trials are being conducted to find whether the inclusion of a certain percentage of buds in pickings would be detrimental to yields.

Plant sources of antibiotics.

848. Madsen, G. C., and Pates, A. L.
Occurrence of antimicrobial substances in chlorophyllose plants growing in Florida.
Pates, A. L., and Madsen, G. C.
Idem. II.
Bot. Gaz., 1952, **113**: 293-300, bibl. 20, and 1955, **116**: 250-61, bibl. 19.

Tests were made for inhibitory activity against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Candida albicans*. Of the 353 species tested, 119 proved inhibitory. These included 1 of 3 Phaeophyta, 5 of 10 Bryophyta and 113 of 340 Tracheophyta. High antimicrobial activity was found in various members of the families Ranunculaceae and Rosaceae. [From authors summaries.]—Dep. Bacteriol Bot., Fla St. Univ., Tallahassee.

849. Guyot, L., Guillemat, J., and Montégut, J.
De l'effet biostatique sélectif exercé par certaines plantes phytotoxiques sur la microflore du sol. (**On the selective biostatic effect exercised on the soil microflora by some phytotoxic plants.**)
Ann. Épiphyt., 1955, **6**: 119-63, bibl. 2, illus.

Extracts of *Helleborus foetidus* were found in laboratory experiments to have a biostatic effect, either fungistatic, fungicidal or bacteriostatic, on many named micro-organisms, including *Aspergillus*, *Fusarium* and *Penicillium* spp. At concentrations less than those having biostatic action, *H. foetidus* had a stimulating effect on certain species of *Aspergillus*, *Fusarium* and *Penicillium*. Extracts of *Lonicera xylosteum* had a biostatic action on some bacteria and actinomycetes. Extracts of *Centaurea cyanus* and *Sinapis arvensis* had a stimulating effect on *Fusarium oxysporum*.

850. Galanti, M., and Manil, P.
Action antibiotique d'extraits de plantes supérieures. Quelques observations expérimentales sur le genre *Geranium*. (**Antibiotic action of extracts of higher plants. Some experimental observations on the genus *Geranium*.**)
C.R. Soc. Biol., Paris, 1954, **48**: 1892-4, from abstr. in *Rev. appl. Mycol.*, 1955, **34**: 439.

Among plants of 14 genera studied for their antibiotic action on five bacteria, only *Geranium* spp. gave positive results.

Rubber plants.

(*See also* 1174-1190.)

851. van Die, T.
A comparative study of the particle fractions from *Apocynaceae* latices.
Ann. bogor., 1955, **2**: 1-124, bibl. 230.

The plants concerned in this very detailed study included *Alstonia* spp., *Dyera costulata*, *Tabernaemontana* spp., *Conopharyngia holstii*, *Plumiera* spp., *Thevetia peruviana*, *Wrightia pubescens*, *Kickxia arborea* and *Funtumia elastica*. The subjects investigated were the particle content of the latices, the polyisoprene hydrocarbons and the acetone-soluble substances of the latex coagulate, and the localization of polyisoprene and resins in the latex particles.

Seed oils.

(*See also* 865c, n, u, 1263.)

852. Brazilian Government Trade Bureau.
Vegetable oils of Brazil.
[*Publ.*] *Brazilian Govt Trade Bur.* (551 Fifth Ave., N.Y.), from abstr. in *Econ. Bot.*, 1955, **9**: 304.

Oil production in Brazil has risen from 103,000 tons in 1939 to over 195,000 tons in 1950. Over 30 different plants are processed for oil. In this pamphlet brief accounts are given of 21 of these oils, including 5 essential oils (copaifera, rosewood, mint, sassafras and orange). The 6 most important vegetable oils are castor bean, babassu palm, oiticica, cottonseed, peanut and cashew.

853. Markley, K. S.
The mbocaya palm: an economic oil plant of Paraguay.
J. Amer. Oil Chem. Soc., 1955, **32**: 405-14, from abstr. in *Oléagineux*, 1955, **10**: 720.

Notes are given on *Acrocomia totai*, its distribution and culture and the preparation, uses, composition and properties of the kernel and pulp oils.

854. Grindley, D. N., and Akour, A. A.
The seed oils of *Bombax sessile* and of *Lupinus termis*.
J. Sci. Food Agric., 1955, **6**: 461-5, bibl. 10.

The kernels of *Bombax sessile*, until recently known in the Sudan as *Pachira aquatica*, each weigh about 1¾ g. and contain 44% of oil, with a fatty acid composition closely resembling that of palm oil. The tree grows well under rather poor conditions in the southern Sudan and would appear to merit consideration as a cultivated crop. *Lupinus albus* contains only about 9% oil with quite different characteristics, and its cultivation for this purpose would be uneconomic; the whole seed, which contains nearly 35% protein, is, however, of value.—Welcome chem. Lab., Minist. Health, Khartoum.

855. Virelizier, P.
Le ricin. **(Castor.)**
Terre maroc., 1955, **29**: 370-6, illus.

The results are given of castor growing experiments laid down by the Société Organico in different parts of Morocco since 1951. *Perennial culture* is unsuited to the north and east but is eminently satisfactory at Talmest where the minimum and mean temperatures in the coldest month are 1 and 8° C., the maximum and mean temperatures in the hottest month are 43 and 31° C., the rainfall is 450 mm. p.a. and the soil is deep and fertile and has a good moisture-holding capacity. *For annual culture* fertile soils are necessary to enable the plant to complete its life cycle of 120-160 days. For *dry annual culture* deep cultivation and a fine tilth are required. Sowing occurs in groups 40-50 cm. apart in lines 1 m. apart, equivalent to 20,000-25,000 plants per ha. Thinning takes place when the plants have produced the first 2 adult leaves. Good varieties are the Moroccan *Ricinus persicus*, Oued-Beth, Rouge de Fès, Sanguin de Verone, and the American Conner and Cimarron. Yields are 3-8 quintals per ha. *Irrigated annual culture* is considered the best method of intensive production. Densities range from 30,000 to 40,000 plants per ha. Sowing occurs about mid-June. A castor/wheat rotation gives good results. Baker and Blackwell are recommended varieties. Yields are 8-23 quintals per ha, but hybrids now being tested should raise them to 25-30. [For an account of earlier work see *H.A.*, 24: 2908.]

856. Anon.
New semi-dwarf castor bean.
Seed World, 1955, **77**(2): 36-7.

The new variety Custer resists shattering as well as Cimarron, yet is easily threshed clean. It has an outstanding shelling percentage and is 2 weeks earlier than Cimarron. It is expected to be especially desirable for planting on irrigated land in the High Plains and in Arizona, but is also recommended for dry-land plantings in Oklahoma. Custer was developed jointly by the U.S. Department of Agriculture and the Oklahoma Agricultural Experiment Station.

857. Desveaux, R., and Kogane-Charles, M.
Étude sur la germination des graines oléagineuses. Deuxième mémoire. **(Study on the germination of oil seeds. Second report.)**
Ann. agron., 1955, **6**: 337-61, bibl. 42.

The water soluble acids formed during the germination of castor, linseed and maize seeds were studied by paper and silica gel partition chromatography. In dormant castor beans glycolic and malic acid predominated, with some fumaric acid, while in germinating beans the volatile acids present were butyric, acetic and formic. Eight fixed non-ketonic acids were separated on the silica gel, and of these malic acid was the most abundant in the endosperm, and glycolic in the seedling. Castor seedlings 8 days old, contained α-ketoglutaric, oxalacetic, glyoxylic and pyruvic acids of the ketone group.—Lab. Biochem., Inst. nat. agron., Paris.

858. Knowles, P. F.
Safflower—production, processing and utilization.
Econ. Bot., 1955, **9**: 273-99, bibl. 129, illus.

Safflower (*Carthamus tinctorius*), grown formerly for the red dye from its flowers, is now becoming an important source of oil. In California an average of 30,000 acres has been grown annually since 1950. In the U.S. most of the supply is used in the manufacture of alkyd resins and drying oils, while in Europe it is used as edible oil. The meal and hay is used as livestock feed. Information is here given on world distribution, botany, adaptation, culture, diseases, pests, processing, utilization and possibilities of improvement through breeding.—Univ. Calif., Davis.

859. Anon.
Rio and Palmetto.
Agric. Res. Wash., 1955, **3**(12): 16.

These are the first non-shattering sesame varieties adapted for mechanical harvesting that have so far been released for commercial production.

Sundry plants.

(*See also* 865w.)

860. Pardy, A. A.
Notes on indigenous trees and shrubs of Southern Rhodesia.
Rhod. agric. J., 1955, **52**: 330-4, illus.

Short illustrated descriptions are given of (1) *Hyphaene crinita* and *H. ventricosa*, which are tapped to produce an alcoholic drink and which provide seeds used for ornamental purposes; (2) *Phoenix reclinata*, which is sometimes planted as an ornamental and which provides leaves used for native basketwork; (3) *Raphia ruffia*, providing leaf stalks used for rafters, etc., and fibre, wax and ornamental seeds; and (4) *Borassus aethiopum*, of which the fruits, leaves, sap and wood are all utilized.

861. BURLEW, J. S. (EDITOR).
Algal culture from laboratory to pilot plant.
Publ. Carnegie Instn Wash. **600**, 1953, pp. 357, bibl. 297, illus.

This monograph presents a detailed account of the work being done on the culture of algae with a view to eventual large-scale, commercial culture for the production of animal fodder and possibly human food. *Chlorella* has already been grown and harvested continuously on a large scale; it has been shown to have a nutritive value for animal feeding and it, and perhaps some of the other algae, may contain useful chemical raw materials. Most of the monograph, consisting of 22 chapters on various aspects of the subject by different authorities, is made up of reports of investigations carried out under the auspices of the Carnegie Institution of Washington, but some accounts of parallel investigations in other countries are also included.

862. COULSON, C. B.
Plant proteins. V.—Proteins and amino-acids of marine algae.
J. Sci. Food Agric., 1955, **6**: 674-82, bibl. 56.

Proteins have been extracted from three main classes of marine algae, and a large-scale extraction of protein from *Rhodymenia palmata* has been carried out. The approximate amino-acid composition of four proteins has been determined using a rapid method of direct estimation on two-dimensional paper chromatograms. It is found that algal proteins differ little qualitatively from those of land plants. A preliminary examination has been made of ninhydrin-reactive substances from the ethanolic extracts of dried marine algae and unknown ninhydrin-reactive substances (possibly iodo-amino-acids) in the alkaline hydrolysates of *R. palmata* protein. The problem of alginate interference in protein extraction is discussed. [Author's summary.]—Inst. Seaweed Res., Inveresk, Midlothian.

863. HODGE, W. H., AND BISSET, D. A.
Running bamboos for hedges.
Nat. hort. Mag., 1955, **34**: 123-7, illus.

Running, as opposed to clump-forming, bamboos found to make good hedges in the Southern and Middle Atlantic States and along the Pacific coast of the United States include *Phyllostachys meyeri*, *P. purpurata*, *P. nigra*, *Semiarundinaria fastuosa* and *Pseudosasa japonica*. Notes are given on propagation, planting and culture.

864. MCCLURE, F. A., AND KENNARD, W. C.
Propagation of bamboo by whole-culm cuttings.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 283-8, bibl. 14, illus.

Asexual propagation of clump bamboos by whole-culm cuttings without rhizomes is effective for some species. The following species can be propagated by this method, using 1-year-old culms: *Bambusa polymorpha*, middle and tip culm portions only; *B. ventricosa*, all culm portions; *Cephalostachyum pergracile* (clone P.I. 126493), all culm portions; *Guadua angustifolia*, all culm portions; and *Sinocalamus oldhami*, tip portion only. The following species can be propagated by this method, using 2-year-old culms: *Bambusa polymorpha*, middle and tip culm portions; *B. tulda*, all culm portions; *B. tuloides*, tip one-third only; *B. ventricosa*, all culm portions; *Cephalostachyum pergracile* (clone P.I. 126493), all culm portions; *Dendrocalamus strictus*, central and tip culm portions; *Gigantochloa apus*, all culm portions; *Guadua angustifolia*, all culm portions; and *Sinocalamus oldhami*, middle and tip sections only. The following species can be propagated using culms 3 years of age and older: *Bambusa tulda*, all culm portions; *B. tuldoides*, tip portion only; *B. ventricosa*, all culm portions; *Gigantochloa apus*, all culm portions; *Guadua angustifolia* all culm portions; and *Sinocalamus oldhami*, all culm portions. This method is not satisfactory for propagating *Bambusa textilis* and *Cephalostachyum pergracile* (clone P.I. 64808). [From authors' conclusions.]—U.S. Dep. Agric., Washington, D.C., and Mayagüez, P.R.

Noted.

865.

a ANET, F. A. L., AND ROBINSON, SIR R.
Alkaloids of Australian *Strychnos* species. Part II. The constitution of strychnospermine and spermostrychrine.
J. chem. Soc. Lond., 1955, pp. 2253-62, bibl. several in text.
From *Strychnos psilosperma.*

b ANON.
Betel cultivation.
Bull. Indian centr. Coconut Cttee, 1955, **9**: 54-5, illus.

c BEEVERS, H.
Glycerol metabolism in the germinating castor bean.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxviii.

d BHATIA, I. S., SATYANARAYANA, M. N., AND SRINIVASAN, M.
Transfructosidase from *Agave vera cruz* Mill.
Biochem. J., 1955, **61**: 171-4, bibl. 15, illus.

e BISSET, N. G.
The steroid glycosides of the Apocynaceae. Part II.
Indones. J. nat. Sci., 1955, **3**: 76-117, bibl. 168.
A review; species include *Carissa*, *Cerbera* and *Strophanthus*. For part I see *H.A.*, 24: 2922b.

f BLACK, W. A. P., CORNHILL, W. J., AND WOODWARD, F. N.
A preliminary investigation on the chemical composition of sphagnum moss and peat.
J. appl. Chem., 1955, **5**: 484-92, bibl. 28.
Ash, fats, nitrogen, cellulose and sugars, in sphagnum, heather and peat.

g BOSE, S.
Isolation of γ-sitosterol from resin of *Rauwolfia serpentina*, Benth.
Sci. and cult., 1955, **21**: 43, bibl. 7.

h CHILDERS, N. F., ROBLES, P. S., AND LOUSTALOT, A. J.
Bay oil production in Puerto Rico.
Circ. P.R. fed. Exp. Stat. Mayagüez **30**, 1948, pp. 32, bibl. 64, illus. [received 1955].
From *Pimenta racemosa.*

i DJERASSI, C., AND OTHERS.
The constitution of the cactus triterpene queretaroic acid.
Chem. Ind. Lond., 1955, No. 47, pp. 1520-1, bibl. 6.
From 2 species of *Lemaireocereus*, a rich source of triterpenoid glycosides.

j DUCKE, A.
Milletia occidentalis nova leguminosa provavelmente ictiotóxica do Amazonas. (***Milletia occidentalis*, a new leguminous species of the Amazon region probably poisonous to fish.**) [English and French summaries 3 and 4 lines.]
Bol. téc. Inst. agron. Norte, Belém, 1953, No. 28, pp. 35-8, illus. [received 1955].

k JACKSON, P., AND WOLFF, R.
Sublittoral seaweed harvester.
Research, Lond., 1955, **8**: 435-44, bibl. 13, illus.

l KIDD, D. A. A.
Alkaloids of *Rauwolfia* species: the isolation of rescinnamine from *Rauwolfia vomitoria* Afz.
Chem. Ind. Lond., 1955, No. 46, p. 1481, bibl. 4.

m MACPHILLAMY, H. B., AND OTHERS.
***Rauwolfia* alkaloids. XIX. The constitution of deserpidine and reserpine.**
J. Amer. chem. Soc., 1955, **77**: 4335-43, bibl. 15.

n MARAÑON, L. T., CRUZ, A. O., AND TUASON, A. M.
Composition of pili-pulp and pili-pulp oil from the fruit of *Canarium ovatum*.
Philipp. J. Sci., 1954 (issued 1955), **83**: 359-63, bibl. 7.
In composition the pulp resembles avocado and the oil cottonseed oil.

o MILLS, J. S., AND WERNER, A. E. A.
The chemistry of dammar resin.
J. chem. Soc. Lond., 1955, pp. 3132-40, bibl. in text.
From *Hopea* sp.

p MINISTRY OF AGRICULTURE, LONDON.
The Hops Marketing Scheme, 1932, (as amended by the Hops Marketing Scheme (Amendment) Order, 1934, 1939, 1945, 1948, 1949, 1950 and 1955 (b)).
H.M. Stationery Office, London, 1955, pp. 23, 1s.

q MITCHELL, W., AND TRESADERN, F. H.
A modified pyrethrin II assay.
J. Sci. Food Agric., 1955, **6**: 465-7, bibl. 3.

r MOORE, R. H.
Mineral deficiencies in *Derris elliptica*.
Bull. P.R. fed. Exp. Stat. Mayagüez **43**, 1945, pp. 26, bibl. 47, illus. [received 1955].
Sand culture studies on deficiencies of S, N, P, Ca, K, Fe and Mg.

s NAVES, Y.-R.
Essential oil of seeds of *Myrocarpus frondosus* Allem. (Brazilian oleo pardo.)
Perfum. essent. Oil Rec., 1955, **46**(6): 183-4, from abstr. in *Trop. Abstr.*, 1955, **10**, No. c2085.
Composition.

t VAN OS, F. H. L.
Het geneeskruid in deze tijd. (**Medicinal plants today.**) [English summary 8 lines.]
Meded. Dir. Tuinb., 1955, **18**: 741-7.
A general discussion.

u RAO, M. B. S., AND THANDAVARAYAN, K.
A note on an abnormality in the fruits of castor (*Ricinus communis* L.).
Madras agric. J., 1954, **41**: 228-9, illus.
Fruits consisting of a single carpel containing 1-2 ovules.

v U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
World pepper report. Part I. India and Ceylon.
Foreign Agric. Circ. **FTEA, 4-55**, 1955, pp. 25.
Present situation, production and trade.

w WHITE, D. G.
Bamboo culture and utilization in Puerto Rico.
Circ. P.R. fed. Exp. Stat. Mayagüez **29**, 1948, bibl. 31, illus. [received 1955].
Bambusa tulda, B. longispiculata, B. textilis, B. tuldoides, and Sinocalamus oldhami.

x WILDMAN, W. C., AND KAUFMAN, C. J.
Alkaloids of the Amaryllidaceae. V. Alkaloids of *Nerine falcata* Barker and *N. laticoma* (Ker) Dur. and Schinz.
J. Amer. chem. Soc., 1955, **77**: 4807-8.

FLORICULTURE

General.

(*See also* 9, 11, 90, 97-113, 474, 475, 974f, o, s, t, x, 975a, b, e, j, l, 1250.)

866. Winters, H. F.
Some large-leaved ornamental plants for the tropics.
Circ. P.R. fed. Exp. Stat. Mayagüez **35**: 1952, pp. 92, bibl. 34, illus. [received 1955].

Descriptions, with notes on propagation, are given of some 150 species and varieties possessing ornamental green or variegated foliage, showy flowers or distinctive shapes. An index is provided giving scientific and common English and Spanish names.

867. Polak, E.
Die Gartenschätze der Julischen Alpen. (**Garden treasures of the Julian alps.**) From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

An account of the outstanding garden flora of the highest mountain range in Yugoslavia.—Hort. Inst. For. agric. Fac., Belgrade.

868. Ormos, I.
Verwendungsmöglichkeiten des Pflanzenmaterials in der Gartengestaltung. (**The best use of plant material in the establishment of public gardens.**)
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

Consideration is given to the efforts being made in Hungary to put to the best possible use the limited funds available for the purpose. Progress is reported with regard to the choice of special grasses to suit difficult dry climatic conditions.—Hochsch. Garten-Weinb. Budapest.

869. Lawrence, G. H. M.
The Bailey Hortorium and its work.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

An account of a research division of the New York State College of Agriculture, Cornell University, its functions and work, past and present.

870. Friesdorf (Möhring, H. K.)
XXVI. Tätigkeitsbericht 1954 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg. (**26th Annual Report of the Horticultural Research Station at Friesdorf/Bad Godesberg for 1954**), pp. 48, illus.

Work in progress is discussed under the following headings: *I. Nursery equipment.* 1. Research on erection and use of moveable glass in floriculture. 2. Use of coke in various house types and areas. 3. Artificial illumination for, (*a*) supplementing day length with chrysanthemum stocks, *Begonia elatior*, and *Kalanchoe*, (*b*) forcing tulips in a dark cellar or under the bench of a heated house, and (*c*) increasing light energy in winter. *II. Variety and cultural trials.* 1. Growing stock (*Matthiola*) varieties under moveable glass. 2. Chrysanthemum variety trials. 3. Evaluation of *Kalanchoe* varieties. 4. Comparative trials with gloxinia varieties. 5. Forcing trials with gladiolus. 6. Tests on purity of horn chips as fertilizer. [See also abstract 895.]

871. Vanderbrook, C.
Mist spray growing and nutriculture.
Amer. Nurserym., 1955, **102**(9): 13-14, illus.

A short account is given of a large-scale outdoor propagation unit, in which plants are raised from cuttings under mist and then grown on in nutriculture. The cuttings are placed in polyethylene pouches with drainage holes, containing Terralite as a rooting medium and these are stood in well-drained, gravel beds. Cuttings of almost all varieties of chrysanthemum, taken at the end of July and beginning of August and placed under constant mist, rooted within 2 weeks. From 3 weeks after insertion a nutrient solution was given twice a week. Mist applications were gradually reduced after rooting until they were only given at feeding times. The electronic leaf method of controlling mist was not successful, because it was too dependent on air currents and wind drift. Further details of equipment, layout and technical data may be obtained from the Gardening Council, 130 East 59th Street, New York 22, N.Y.

872. Rönspiess, S.
Ein wirklich warmes Vermehrungsbeet. (**A warm propagating case.**)
Gartenwelt. 1955, **55**: 204-5, illus.

A zinc container, about 20 cm. high, was placed in the bottom of a propagating frame and filled with water. A framework, 8-10 cm. high, with a wire netting base was placed on top, and was filled with a moss layer, followed by peat and sand. A hole was left in this section for the passage of an electric water heater and for refilling the water trough. A third section to support the glass frame was placed on top. Both warmth and humidity were favourable for cuttings, which needed little attention. There was 100% rooting of *Ficus* spp. cuttings in 4 weeks at 30-32° C., without syringing. Successful results were also obtained with foliage plants, *Gardenia jasminoides*, fuchsias, begonias and *Euphorbia* spp.

873. Mowat, J. L.
Propagation by root cuttings.
Gdnrs' Chron., 1955, **138**: 162, illus.

Exposed roots of rock plants growing in sand and gravel developed healthy vegetative shoots. Among plants which reacted to exposure were *Cytisus kewensis*, *C. ardoinii*, *Convolvulus cneorum* and hawthorn (*Crataegus*).

874. Doorenbos, J.
Horticultural possibilities of photoperiodism.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

It is now known whether most cultivated plants are long-day, short-day or day-neutral. The main experimental difficulty is that other environmental factors, such as night temperature and light intensity, affect the photoperiodic reaction. This desiderates in trials very exactly controlled conditions. Photoperiod affects not only flowering but other processes such as storage organ formation and the growth of woody plants. The possible use of regulated photoperiod in the cultivation of rhododendron and other plants such as dahlias, *Salvia splendens* and *Chrysanthemum morifolium* is discussed.—Hort. Lab., Wageningen.

875. Penningsfeld, F.
Substrat- und Nährlösungsansprüche von Zierpflanzen in Hydrokultur. **(Medium and nutrient requirements of ornamentals in water culture.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The author discusses the advantages and disadvantages of different media. Highland peat seems to be the best of all. Successful attempts have been made to group ornamentals according to their sensitivity to different concentrations of nutrient solutions. Deficiency symptoms observed on particular plants with regard to particular macro- and micro-nutrients are described.—Staatl. Lehr- Forschanst. Gartenb, Weihenstephan.

876. Wezenberg, H. J.
Mineral deficiencies in floricultural crops.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Phenomena observed and measures taken to remedy mineral deficiencies in flower crops are discussed. It is noted [in the summary] that where Mn deficiency occurs in chrysanthemums, roses and lilac it can be prevented by lowering the pH of the soil. This is one of many deficiencies discussed.—Exp. Stat. Floric., Aalsmeer, Netherlands.

877. Morel, G.
Guérison de plantes atteintes de maladies à virus. **(Curing virus-infected plants.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The technique described allows of the resuscitation as healthy plants of several horticultural species such as dahlias, carnations and potatoes, previously infected with virus. It is based on the fact that generally speaking. the apical meristem of the central stem remains free from infection. This is aseptically removed and grown on a special medium to reproduce a new plant.—Centr. nat. Rech. agron., Versailles.

878. Fjelddalen, J.
Veksthussnutebillen. **(The vine weevil.)**
Gartneryrket, 1955, **45**: 631-4, bibl. 6, illus.

The biology of *Otiorrhynchus sulcatus* and the damage it causes to many ornamental plants in glasshouse and nursery, especially in the larval stage, are discussed. Steam sterilization of the soil and watering with chlordane at specified dosages are recommended for control.

879. Schread, J. C.
Mite pests of ornamentals and their control.
Bull. Conn. agric. Exp. Stat. **591**, 1955, pp. 19, bibl. 8, illus.

Aramite, Ovotran, Chem-Mite (*p*-chlorophenyl *p*-chlorobenzene sulphenone), chlorobenzilate, Dimite (di(*p*-chlorophenyl) methylcarbinol) and malathion, as emulsions and wettable powders, controlled the following mite species: spruce mite (*Paratetranychus ununguis*) on spruce, hemlock, and arborvitae; gall mite (*Eriophyes thuje*) on hemlock; privet mite (*Brevipalpus inornatus*) and 2-spotted mite (*Tetranychus bimaculatus*) on azaleas; 2-spotted mite on yew; and southern red mite (*Paratetranychus ilicis*) on holly. Ovotran and malathion were also effective as low concentration dusts. Control of 2-spotted mite on glasshouse carnations was obtained by Systox and 12008 (O,O-diethyl S-isopropylmercapto-methyl dithiophosphate) applied as soil drenches.

880. Kirk, L. K., and Mahlstede, J. P.
Packaging dormant nursery stock for shipment to retail markets.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 472-82, bibl. 10.

Various types of packaging materials and methods were tested on carnation, delphinium, rose and strawberry plants shipped at 3 dates from April to June. No method of packaging tested prevented losses due to lateness of shipment. No packaging material or method gave uniform results with all types of plant material, as each had different moisture, temperature and aeration tolerances. The inclusion of moisture in polyethylene-wrapped packages did not improve plant survival and in some cases was injurious. The use of polyethylene bags, however, was found to reduce material and shipping costs, to reduce moisture losses, to increase plant survival and to improve the appearance of the packages [see also *H.A.*, 25: 806].—Iowa St. Coll., Ames.

881. Mahlstede, J. P.
Polyethylene packaging of ornamental plants.
Amer. Nurserym., 1955, **102**(5): 9-10, 54-8, illus.

Trials on the packaging of plants have given promising, but variable and sometimes contradictory, results. Roses (H.T.), *Spiraea vanhouttei* and privet, dug in November and packed 3 to 5 weeks later in sealed polyethylene bags and in 2 grades of poly-kraft paper, were held until May in common storage (temperatures below 50° F.) without loss. A fine mist spray applied to roses and peaches before packaging in March increased field survival, but desiccation of the plants gave nearly as good results. In the same series captan reduced storage mould incidence but also reduced field survival. Puratized 1122 (a mercaptic) at 1,000 p.p.m. gave 60 % control of storage rots of roses. Captan applied to delphiniums before packing and storage gave complete control of storage moulds, but little or no mould control in carnations was obtained with any compound applied. Pre-digging treatment of deciduous stock with maleic hydrazide (MH) reduced the incidence of storage mould in prepackaged products by 83 %, but premature bud break in common storage was not prevented by concentrations up to 2000 p.p.m. Carnations and delphiniums were packaged alone and in combination on March 9 in ventilated and non-ventilated bags in cool (40° F.) and freezing storage conditions; both types of storage were potentially effective, but the carnations showed poor field survival when held after May 1, although in the case of the cool stored plants the deterioration was less in the combination packs than in the single packs; by contrast, among the plants held in freezing storage the delphiniums in the combination packs survived better, and the carnations worse, than those in single packs. Herbaceous perennials, treated with 100-2000 p.p.m. MH in the field, showed no signs of deterioration after storage and complete mould control was obtained up to June 1; records of field survival showed that concentrations below 500 p.p.m. should be used for hollyhocks and balloon flowers [*Platycodon* sp.] and below 1000 p.p.m. for artemisias and campanulas. June-bearing strawberries, treated with 250-1000 p.p.m. MH in mid-September and stored in polyethylene bags at 40° F. before planting out in March or June, showed better survival, but poorer runner production, than control plants; flowering was not affected. Bulk freezing of perennials in polykraft-lined orange crates (at 34° F.) resulted in much rotting in the centre where cooling was relatively slow. [See also several papers by the same author in *H.A.*, Vol. 25.]

882. Feddersen, M., Nelson, P. K., and others.
Flower arrangement.
Brooklyn bot. Gdn Rec., 1955, **11**: 180-241, illus., [available as a separate, price 75 cents].

The whole of this number of the journal is devoted to the many aspects of floral decoration, including the use of design and colour, period and Japanese arrangements, table settings, drying flowers and making containers. Numerous photographs of arrangements are included.

Annual and herbaceous plants.

(*See also* 31, 38, 42, 49, 69-77, 515, 974a, c, g, i, l-n, q, r, u, 975, h, o.)

883. Mastalerz, J. W.
Soil nitrate levels, light intensity, growing temperatures and the quality of cut flowers stored at 31° F.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 483-92, bibl. 7, illus.

A study was made of the effects of environmental conditions during the growing period on the quality of chrysanthemums and carnations after cold storage. Soil nitrate levels had no effect on the appearance or life of cut flowers of either species or on the respiration of carnations. A reduction in light intensity or an increase in growing temperature shortened the life, and was deterimental to the quality of flowers upon removal from storage at 31° F. This effect was modified by the season of the year at which the crop matured.—Cornell Univ.

884. van Onsem, J. G.
La lumière artificielle dans la culture d'*Aechmea fasciata*. (**Artificial lighting in the culture of *Aechmea fasciata*.**)
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Normally from seed to flower takes 3 years with *Aechmea fasciata*. The author discusses how by various light treatments it has been found possible to reduce the period necessary to produce flowers by several months.—Stat. Rech. Plantes ornament. Ghent, Belgium.

885. Vinot, M., and Bouscary, A.
L'utilité de la description des nouveautés en vue de leur protection légale, un exemple appliqué, l'oeillet. (**The usefulness of varietal descriptions as a means to their legal protection, the carnation affording a practical example.**)
From summary *Pap. 14th int. hort. Congr. 1955*, Scheveningen, *see note p. 4.*

The authors consider that the descriptions of new carnation varieties cannot reasonably be left to the horticulturist but must be made by biologists and botanists in co-operation. It should in fact be entrusted to specialist research stations.—Centr. Rech. agron. Provence, Antibes, France.

886. Richmond, J. W. S.
The culture of carnations in sand and sandy composts.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

A compost containing sand, peat and old mushroom compost is the medium favoured. A formula providing for Fe, Mn and B as well as the major nutrients is used. The medium is analysed every 3 months and the necessary adjustments made. Capital cost is only half that of a sub-irrigation system. Growth is very satisfactory and there is no disease.—Whitehill Nursery, Blackpool, England.

887. Hanzel, R. J., Nelson, K. S., and Kiplinger, D. C.
Floral initiation and development in the carnation, var. Northland.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 455-62, bibl. 7, illus.

Northland carnation plants were pinched at 2-week intervals from 25 February to 23 April, 1954, and the stem apices arising from these pinches were examined at intervals for 18 weeks after pinching. Four stages of development in the stem apex are described and illustrated. At the 16th week after pinching 50% or more of the stems examined had reached the elongation and floral initiation stage. The rate of general initiation was the same, regardless of time of pinching. Floral development proceeded more rapidly in the stems resulting from the later pinches. There was a consistent relationship between number of internodes and stage of development but none between either of these factors and stem length. The number of internodes on flowering stems varied with the position of the stem on the plant.—Ohio agric. Exp. Stat., Wooster.

888. Blake, J.
Photoperiodism of the perpetual-flowering carnation.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

It has been shown that, contrary to previous opinion, the perpetual-flowering carnation is sensitive to photoperiod. Short days of 8 hours delayed flower initiation and produced flowering shoots with significantly more nodes than were produced in long days. The day-length response was most marked with low levels of nitrogen nutrition. Internode length increased consistently with increases in day-length, but in this case there did not appear to be any nitrogen-photoperiod interaction. No significant interaction between photoperiod and temperature has so far been demonstrated. —Univ. Reading.

889. Scholten, G.
Wilting diseases of carnations in the Netherlands.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Fusarium oxysporum is no longer a serious problem since the commonly grown varieties are only slightly susceptible, but *Phialophora* (*Verticillium*) *cinerescens* and *Pseudomonas caryophylli* remain dangerous. Chemical and antibiotic remedies are being tested at Aalsmeer and the premises of all firms growing cuttings and young carnation plants for sale to the trade are regularly inspected.—Exp. Stat. Floric., Aalsmeer, Netherlands.

890. HELLMERS, E.
Bacterial wilt of carnations and the control of the disease.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Two types of symptom expression shown in the presence of *Pseudomonas caryophylli* are described. The remedy lies in planting healthy material only and the author describes how to determine whether any given piece of material is healthy. Very promising results have been obtained in trials with the antibiotics streptomycin and Terramycin, but these are not yet in commercial use. —Vet. agric. Coll., Copenhagen. [See also *H.A.*, 25: 4186.]

891. CHAPLIN, P. H.
Prepackaging carnations.
Comm. Gr, 1955, No. 3122, pp. 900-1, illus.

A grower's experience with prepackaging is described. The flowers are each supported in a cradle, and the bunches are wrapped in clear film, with the stalks protruding so that they may be immersed in water without disarranging the pack. The date of cutting and packing is stamped on each pack. The packs are transported in non-returnable fibre board containers.

892. CHAN, A. P.
Some factors affecting flower bud development of chrysanthemums.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Studies are described which have shown that the following factors may influence the initiation and development of chrysanthemum flower buds: Temperatures at which stock plants are held; temperatures before and after induction of flower buds; mineral nutrition; age of plants at time of induction; light intensities before and during induction.—Div. Hort., Centr. Exp. Farm, Ottawa.

893. MAATSCH, R., AND RÜNGER, W.
Ganzjahresproduktion von Chrysanthemum. **(Year-round production of chrysanthemums.)**
Gartenwelt. 1955, **55**: 201-2, bibl. 2.

Chrysanthemums, as cut flowers and pot plants, can be produced throughout the year by adjusting daylength, although all varieties do not respond equally well. Most of those tested in Germany produced well-developed flowers from March to December; three varieties, Anny Curry, Perfection and Winny Quinn produced lower quality flowers in the early summer months. Between December and February many varieties produced poor quality flowers on weak stems, but 8 made satisfactory growth. A table is provided showing the time taken by 35 varieties to flower from the start of short day treatment.—Inst. Zierpfl., tech. Hochsch. Hanover.

894. PEASE, R. W.
The cultivation of fringed gentians.
Sci. serves your Fm, Spring 1955, pp. 6, 8, bibl. 2, illus.

Seed of *Gentiana crinata* was successfully germinated in a box containing equal parts of sterilized potting compost and peat moss. The seed was sown in mid-October and covered with dry sphagnum moss and with burlap [hessian] cloths which were kept moistened. No direct watering was done. In the spring the plants were grown in shade and watered by a mist spray. The young plants were transplanted in their second spring and in June were transferred to a shaded peat moss bed.—W. Va agric. Exp. Stat.

895. FRIESDORF.
Versuche mit Gloxinien. **(Experiments with gloxinias.)**
TätigkBer. gärtn. Versuchsanst. Friesdorf, 1954, **26**: 12-13, illus.

Gloxinia plants were raised from seed sown in mid-November. One batch kept in a heated house (20-24° C.) without extra light flowered at the beginning of June. A second batch was grown in a cool house from 7 December to 3 February under continuous illumination; the plants were then forced in heat, but without extra lighting, and flowered in mid-March.

896. SOUSTER, J.
A striking greenhouse plant.
Gdnrs' Chron., 1955, **138**: 141-2, illus.

Musschia wollastonii is one of the two species of the genus indigenous to Madeira. It likes cool moist conditions and in cultivation flowers in the third year from seed. It is a tall striking plant with pale greenish-yellow flowers which structurally resemble those of *Campanula*.—Roy. bot. Gdns, Kew.

897. DOWD, D.
Pansies on trial.
Gdn. J. N.Y. bot. Gdn, 1955, **5**: 149-51, illus.

Factors noted in a trial of over 90 varieties and strains were: earliness of flowering, size of flowers, trueness to type and general quality. Types of flowers are classified according to flower colour and pattern. Recommendations for raising pansies from seed are included.

898. WALKER, J.
Antirrhinum rust, *Puccinia antirrhini* D. & H. in Australia.
Reprinted from *Proc. Linn. Soc. N.S.W.*, 1954, **79**(3/4): 145-55, bibl. 25, illus.

Antirrhinum rust, caused by a virulent strain of *P. antirrhini*, was first recorded in Australia in 1952 and is now widespread. Detailed investigations are reported on the fungus and its epidemiology. Spore dust was found in many samples of imported seeds, and this is thought to have been the way by which rust reached Australia. All 35 varieties of snapdragon tested proved susceptible. [See also *H.A.*, 24: 4097.]

899. MAATSCH, R.
Beitrag zur Frage der Erhöhung der Prozente gefüllt blühender und der Bedeutung Allgefüllter Levkojen für den Erwerbsgartenbau. **(On the problem of increasing the proportion of double-flowered stock plants and the importance to the trade of achieving 100% double flowers.)**
Züchter, 1955, **25**: 206-9, bibl. 5, illus.

German and foreign work on double flowering in stocks is discussed. The author's experiments showed that seed germinating on the 4th day after sowing (on filter paper or in potting soil) yielded a much higher proportion of double-flowered plants (63%-68%) than seed germinating on the 5th-7th day.—Tech. Hochschule, Hanover.

900. Ozawa, H., and Taneda, T.
Investigations on some of the characters of the new stock variety Earliest White. No. 2. On flower bud differentiation and development. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 85-94, bibl. 9, illus.

Seedlings of the stock variety Earliest White [H.A., 25: 884t] grown at a minimum temperature of 62° F. differentiated flower buds 40 to 65 days after sowing when the plants had 10 leaves and were only about 5 cm. high. The subsequent stages of flower development, which took 50 to 70 days, are described. The total time from sowing to blossoming was 100 to 125 days. In a second trial this variety and two others, Blood Red (ten weeks) and Ruby (non-branching), were grown under long-day conditions with supplementary light supplied throughout the night, Differentiation was not affected by long days, Earliest White taking 65 days, Blood Red 92 days and Ruby 102 days. Flower bud development in Blood Red and Ruby was also not affected by long days, but in Earliest White flowering was earlier by about 14 days under long-day conditions.

Bulbs, tubers, etc.

(*See also* 974j, w, y, z, 975c, d, f, g, i, k, m, n.)

901. American Association of Nurserymen.
Bulbs, corms and tubers.
Nat. hort. Mag., 1955, **34**: 173-5.

This addendum to the *American Standard for Nursery Stock* (1949 edition, revised 1951), contains grade names and sizes for 15 types of bulb, corm and tuber.

902. van Slogteren, D. H. M.
Selection of virus-free plants from partially infested stocks with special reference to serological methods.
From summary *Pap. 14th int. hort. Congr.*, 1955, Scheveningen, *see note p. 4*.

The method of roguing stocks and destroying all infected plants has made it possible to build up virus-free stocks of certain varieties of hyacinth, daffodil and iris. Some plants may, however, carry viruses without showing symptoms. Here serological methods offer a means of diagnosis and antisera have been procured after injecting animals with suspensions of plant viruses. Different microtechniques have been evolved for practical tests with these antisera.—Lab. Bulb Res. Lisse, Netherlands.

903. Brenchley, G. H., and Johnstone, K. H.
Grey mould of anemones in Cornwall.
Plant Path., 1955, **4**: 54-7.

Some cultural control of *Botrytis cinerea* on anemones may be obtained by providing windbreaks and by skilled picking. High N applications should be balanced by sufficient K_2O supplies. Wide spacing, within economic limits, also reduces *Botrytis* attack. Dusting with tetrachloronitrobenzene was not effective in checking grey mould attacks.

904. Dosdall, L. T.
Calla rhizome treatments.
Plant Dis. Reptr, 1955, **39**: 779-80.

A 5-minute dip in 1% peracetic acid gave good control of both phytophthora root rot (*P. cryptogea* var. *richardiae*) and bacterial soft rot (*Erwinia* spp.) in calla [arum] rhizomes. Against the former it gave 71% good plants compared with 20-23% in the control and against the latter 82% survival compared with 58% in the control. None of the other compounds tested gave control of both diseases. Peracetic acid also resulted in much the best vigour and appearance. Its drawbacks are its instability and the hazards connected with its use.—Univ. Minnesota, St. Paul.

905. van Onsem, J. G.
Le bouturage de variétés de *Bégonia multiflora* au moyen d'hormones végétales. **(The propagation by cuttings of *Begonia multiflora* varieties with the aid of plant hormones.)** [English and German summaries 8 and 7 lines respectively.]
Rev. Agric. Brux., 1955, **8**: 1331-6, illus.

Cuttings of the main varieties of *Begonia multiflora* were treated with hormones during normal propagation processes. The best rooting was obtained with IBA and NAA treatments, and application in charcoal was the most practical method. Optimum concentrations varied with variety between 0·2% and 0·4% of IBA and 0·1% and 0·2% of NAA; at the higher oncentrations some varieties showed scorching. Combined treatments of IBA and NAA sometimes gave better results than either separately, particularly with woody cuttings. —Stat. Rech. État. Amél. Plantes ornament., Ghent.

906. Köster, P.
Auswertung von Erduntersuchungsergebnissen. **(Evaluation of soil analysis results.)**
Gartenwelt., 1955, **55**: 206, illus.

A manurial trial, using a compost of low P_2O_5 content, showed that much improved growth of young cyclamen seedlings was obtained by application of 3 kg./cu.m. of superphosphate. The compost, which contained a large proportion of a calcareous clayey silt, had a P_2O_5 content of 0·4 mg./100 g. without any manure and 5 mg./100 g. after the application of superphosphate or a complete fertilizer. For comparison, a complete fertilizer (10:10:15) was applied at 1 kg./cu.m. to a silty soil of light loamy sand. Analysis showed that this application raised the P_2O_5 content from 0·6 mg. to 5·4 mg./100 g. soil.—Lab. Erdbereit., Hamburg.

907. Łebkowski, J.
Badania nad zastosowaniem nawozów pomocniczych i wpływem pH pleby przy uprawie gdul, *Cyclamen persicum*—Mill. **(Studies on the application of commercial fertilizers and the influence of the soil pH in growing cyclamen (*Cyclamen persicum*).** [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1954, **70**: 327-42, bibl. 10, illus.

The effects of NPK applied in various combinations, rates and frequencies and of $CaCO_3$ on cyclamen were studied. Fertilizer applications greatly increased the number of both flowers and leaves as compared with the controls. The best results were obtained with 0·65 g.N, 0·39 g. P_2O_5 and 0·52 g. K_2O per plant applied in 13 doses at 15-day intervals. Acid fertilizers (ammonium sulphate) changed the colour of the flowers and were not as effective as alkaline fertilizers. The optimum soil reaction for cyclamen was found to lie between pH 6·0 and pH 7·0.

908. Maatsch, R., and Hassenkamp, R.
Schnittblumenerträge bei Cyclamen. (**Cut flower yield from cyclamen.**)
Gartenwelt., 1955, **55**: 269.

A study of cut flower yields from cyclamen was carried out with white- and dark-red-flowered plants, each from 2 sources. Total yields showed differences between plants of different origins averaging 6-7 flowers per plant. The yields from the white plants were highest at the end of November and December; peak yield periods for the dark red plants were mid-October and January. Peak flowering periods were strongly dependent on light and temperature.

909. Rünger, W.
Die photoperiodische Reaktion von Dahlien. (**The photoperiodic reaction of dahlias.**)
Gartenwelt, 1955, **55**: 223-4, bibl. 5, illus.

In dahlias long days stimulate aerial growth, and short days stimulate tuber formation [see also *H.A.*, 25: 3105]. Short day treatment for 20-30 days is sufficient to increase tuber size 3-5 times in varieties which are slow to form tubers. Tubers, sufficiently large for overwintering, may be induced in plants from late cuttings by giving early short-day treatment. Winter production of cut flowers induced by photoperiodic treatment is not recommended as low light intensity results in poor quality flowers.—Inst. Zierpfl., tech. Hochsch., Hanover.

910. Woltz, S. S.
Effect of differential supplies of nitrogen, potassium and calcium on quality and yield of gladiolus flowers and corms.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 427-35, bibl. 9.

Sand culture experiments showed that flowering-size gladiolus corms did not contain sufficient reserves of N or K to produce normal foliage and flowers, while the reserve of Ca was almost adequate for normal production of foliage but definitely inadequate for flowers. Symptoms of Ca deficiency are described and their resemblance to physiological bud rot is pointed out. High levels of N, K and Mg accentuated Ca deficiency. In field experiments small Picardy corms, grown in autumn, required high levels of N for optimum production of flowers and corms. Increasing the level of N supply, however, increased the incidence of *Fusarium* corm rot. Until *Fusarium* can be controlled, N supply must be kept at a sub-optimal level. Flowering-size Valeria corms needed only a moderate N supply for best production of flowers. Picardy and Valeria did not show a response to increased K. Rosa van Lima and June Bells, grown in the spring, did not show much response to N, probably owing to sub-optimal water supply and nematode attack, but showed a greater response to K than the autumn-grown crop. It is concluded that small corms require more fertilizer, especially N, than large corms, but that even with large corms serious deficiencies may occur in Florida soils.—Gulf Coast Exp. Stat., Bradenton, Fla. [See also *H.A.*, 25: 3109.]

911. Ryan, G. F.
Effects of temperature on rest in gladiolus corms.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 463-71, bibl. 4.

Gladiolus corms which reached maturity with soil temperatures above 15° C. had a somewhat deeper rest than corms which were exposed intermittently to temperatures at or below 10° C. during the final few weeks before harvest. High temperature (35° C.) curing of summer-grown corms prolonged the rest in one experiment, but had little or no effect in another case. The factors influencing the response to high temperature curing were not determined. Winter-grown corms sprouted more promptly after 35° C. curing than after 21° C. curing. When started immediately after curing 1 month of 4° C. storage broke the rest of summer-grown Valeria corms. Further storage did not shorten the time from planting to sprouting enough to make up for the additional time in storage. When started 5 weeks later, 7 days of 4° C. storage exerted a maximum rest-breaking effect. When started immediately after curing, storage at 35° C. prolonged the rest of summer-grown Valeria corms. When started 5 weeks later, exposure to 35° C. resulted in more prompt sprouting than after uninterrupted storage at 21° C. A week at 35° C. produced this effect on corms originally cured at 21° C., but a longer period of exposure was necessary for corms whose rest had been prolonged by curing at 35° C. Interrupting cold storage with 4 to 6-day intervals at high temperature did not influence the rest-breaking effect of the low temperature. [From author's summary.]—Univ. Calif., Los Angeles.

912. Schenk, P. K.
Een bladvlekkenziekte van de gladiool, veroorzaakt door *Stemphylium botryosum* Wallr. (**A leaf spot disease of gladiolus caused by *Stemphylium botryosum.***)
[English summary ¼ p.]
Tijdschr. PlZiekt., 1955, **61**: 154-8, bibl. 9, illus.

The symptoms of a leaf spot of gladiolus caused by *Stemphylium botryosum* are described. Of the few susceptible varieties Picardy and Harry Hopkins may be severely affected, although a strain of Picardy has shown some resistance. For control zinc carbamate sprays, applied weekly from mid-June or twice weekly under unfavourable conditions are recommended.—Lab. Bloemboll. Lisse.

913. Carpenter, T. R., and Gammon, E. T.
Methyl bromide gas treatments of dormant gladiolus corms and of sclerotia of *Sclerotium rolfsii.*
Phytopathology, 1955, **45**: 520-1.

Tests demonstrated that dormant gladiolus corms will not tolerate treatments with methyl bromide gas at concentrations necessary to kill the sclerotia of *Sclerotium rolfsii*.—Calif. Dep. Agric., Sacramento.

914. Emsweller, S. L.
Improvement and propagation of lilies.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Although inter-specific hybridization in *Lilium* is difficult, the few authentic hybrids so far obtained are very promising for future progress. Normal propagation of varieties is by scales. Notes are given on the procedure adopted at Beltsville for this method of reproduction.—Ornamental Plants Sect., Agric. Res. Serv., Beltsville, Md.

915. Stuart, N. W., Gould, C. J., and Gill, D.
Influence of storage temperature and other factors on forcing of Easter lilies, iris and tulips.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Particular treatments are discussed which have proved successful in inducing earlier flowering in Easter lilies, Wedgewood and Dutch irises and tulips [see also *H.A.* 25: 825, 838, 840 and earlier]. The usefulness is noted of polyethylene plastic film as a liner for cases containing peat in which to store Easter lily bulbs.—Beltsville, Md, Puyallup, Wash., and Tifton, Ga.

916. Wickson, M. E., and Towers, G. H. N.
Metabolism in *Lilium* with reference to γ-methyleneglutamic acid.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxviii.

γ-Methyleneglutamic acid and its keto analogue are not present in *Lilium* seed, but occur in increasing amounts soon after germination. C^{14} studies with seedlings indicate that these compounds are not readily formed from exogenous carbon and that photosynthetic and respiratory pathways are comparable to those reported by others for higher plants. These compounds may become tagged when seedlings are fed certain enzyme inhibitors.—McGill Univ., Montreal.

917. Gill, D. L., Smith, F. F., and Brierley, P.
Controls for Easter lily fleck studies at Beltsville Station.
Flor. Exch., 1955, **125**(19): 13, 50-1.

Necrotic fleck of Easter lilies is caused by 2 virus components, both of which are transmitted by aphids. Field and greenhouse tests were carried out at Beltsville, Md, and Tifton, Ga, on aphid control by systemic insecticides. The spread of Easter lily fleck was reduced under field conditions by spraying at fortnightly intervals with schradan 1-600 or demeton 1-2,000, or by soaking the bulbs for 1 hour in demeton 1-500 before planting. Other recommended measures to reduce spread are roguing diseased plants, and planting good stock at a distance from any known source of the disease.

918. Caveness, F. E., and Jensen, H. J.
Investigations of various therapeutic measures to eliminate root-lesion nematodes from Easter lilies.
Plant Dis. Reptr, 1955, **39**: 710-15, bibl. 6.

The removal of root remnants after cold storage reduced the number of infected bulbs by 84%, had no apparent effect on the forcing quality, and was as efficient as, and less injurious than, the hot water soaks, chemical soaks, and vacuum fumigation trials investigated. [From authors' abstracts. See also *H.A.*, 25: 3118.]—Ore. agric. Exp. Stat., Corvallis.

919. Beijer, J. J.
The influence of normal and artificially created climatic conditions on the flowering of daffodils.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

A detailed account is given of the treatment necessary (1) to produce Christmas flowering in daffodils and (2) preparatory to sending bulbs to the Southern Hemisphere from Europe.—Lab. Bulb Res., Lisse, Netherlands.

920. Woodville, H. C.
Experiments on the control of bulb fly in narcissus.
Plant Path., 1955, **4**: 83-4.

Pre-planting dips of aldrin and dieldrin were tested for the control of *Merodon equestris*. Both chemicals were used at 0·2% in the first trial, and bulbs were dipped for 15 and 60 minutes. The treatments gave complete or nearly complete protection and there was no phytotoxicity. In a second trial a concentration of 0·4% was used. Infestation was reduced from 24% on the controls to less than 1% in all treatments. A 60-minute dip with aldrin gave complete protection. Dieldrin at 0·05% and 0·1% was added to a warm-water bath, and the bulbs were treated for 3 hours at 110° F. Treated bulbs were undamaged by fly, whereas 15·5% of the controls were attacked, but the treatments were rather phytotoxic.—N.A.A.S., Starcross, Exeter.

921. Bergeson, G. B.
The use of systemic phosphates for control of *Ditylenchus dipsaci* on alfalfa and daffodils.
Plant Dis. Reptr, 1955, **39**: 705-9, bibl. 3.

In greenhouse tests against *Ditylenchus dipsaci* on daffodils 0·1% drenches of OS1836 (diethyl 1-chlorovinyl phosphate) and Systox applied round the base of the stems gave nearly 100% control within 1 and 4 weeks respectively. With concentrations of 1·0% and 0·5% both compounds were somewhat phytotoxic. OMPA was not phytotoxic, but was less effective. —Dep. Plant Nematol., Univ. Calif.

922. Blasdale, W. C.
Some Chilean species of *Oxalis*.
Nat. hort. Mag., 1955, **34**: 128-38, bibl. several in text, illus.

Information is given on the characters and culture as garden and greenhouse plants of *O. valdiviensis*, *O. rosea*, *O. lobata*, *O. adenophylla*, *O. enneaphylla* and *O. carnosa*. [See also abstract 672.]

923. Jaenichen, H.
Das Tulpenfeuer, die wichtigste Tulpenkrankheit. **(Tulip fire, the most important tulip disease.)**
Gartenwelt, 1955, **55**: 226-7, illus.

Symptoms of tulip fire (*Botrytis parasitica*) are described. Crop rotation helps to reduce infection. Bulb disinfection by soaking in mercuric chloride (0·1% for 30 min.) or formaldehyde (0·25% for 1 hour) was more successful for practical purposes than longer treatments at lower concentrations. During the vegetative period preventive sprays of organic fungicides may give protection from spore infection.

924. MATHER, J. C.
Trials on soil transmission of tobacco necrosis virus in tulips.
Plant Path., 1955, **4**: 96-7, bibl. 2.

Healthy and infected bulbs of the varieties Zimmerman and Korneforos were planted in boxes containing healthy, "infected", and sterilized soil and were subsequently forced. During the trials, which lasted for 3 years, there was little transference of tobacco necrosis virus from "infected" soil to healthy bulbs.—N.A.A.S., Kirton.

Lawns.

(*See also* 77, 479-487.)

925. ANDERSEN, A. M.
Fungi associated with germination tests of Merion bluegrass.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): x.

Merion Kentucky bluegrass germinated on a paper substrate produced many seedlings with short or no roots. The presence of several fungi, which are listed, was thought to account for this. Tests showed that the optimum method for germination trials is to sow the seed in Petri dishes on a mixture of sand and soil, and pre-chill at 10° C. for 5 days, with subsequent germination for 28 days at 15° C. dark–25° C. light temperatures.—U.S. Dep. Agric., Beltsville, Md.

926. SHURTLEFF, M. C., JR.
Brown patch of turf caused by *Rhizoctonia solani*.
Diss Abstr., 1955, **15**: 317-18, being *Publ.* 11,120 of 183 pp.

Agrostis spp. were more susceptible to brown patch than fescues, rye and bluegrass. *Rhizoctonia solani* mycelium survived in dry grass mowings for up to 4 months. Of 10 compounds tested as inhibitors of sclerotium germination, only Calo-clor, Calocure and Puratized Agricultural Spray were effective. Three applications of Calo-clor and Calocure (at 2 oz./10 gal./ 1,000 sq. ft.) in late June and early July were as effective in controlling brown patch as 8 sprays of these compounds, at the same rate, applied at fortnightly intervals. Of many compounds tested as chemotherapeutants, those giving more than 75% control without severe injury were: Phygon, Tersan 75, cupric salt of maleic hydrazide, Endomycin, 8-hydroxyquinoline benzoate and sulphate, and Captan 50W. [See also *H.A.*, 25: 4224.]

Succulents.

(*See also* 974k.)

927. CONSTANTINESCU, H.-J.
Mehr blühende Pflanzen zu Advent! **(More flowering plants for Advent!)**
Gartenwelt, 1955, **55**: 269-70, illus.

Epiphyllum Königers Weihnachtsfreude starts to flower about a fortnight before Christmas. The flower colour is light salmon and growth is upright. Notes on culture are given.

928. DURBIN, R. D., DAVIS, L. H., AND BAKER, K. F.
A helminthosporium stem rot of cacti.
Phytopathology, 1955, **45**: 509-12, bibl. 9, illus.

A description is given of a top or basal rot due to *Helminthosporium cactivorum* observed on several genera of cacti in southern California. Successful control has been achieved by (1) applying 2-4 lb. captan per 100 gal. water plus 6 fl. oz. DuPont Spreader-Sticker on a 10-14 day schedule, (2) roguing diseased plants, and (3) sterilizing the soil.—Univ. Calif., Los Angeles.

929. RESENDE, F.
Influence, in grafting, of the hypobiont on flowering of the epibiont.
Portugal. Acta biol., 1954, **4**: 91-7, bibl. 16, illus.

Kalanchoë quartiniana and *K. blossfeldiana* var. Feuerblüte have different floral initiation periods, but when leafy scions of these 2 species are grafted onto leafless stocks of *K. blossfeldiana* var. α they both initiate flowers at the same time as control plants of the rootstock. This effect of a leafless stock on a leafy scion is attributed either to a specific regulating mechanism of the root system in the absorption of N and of minor elements contributing to the synthesis of natural auxin and anti-auxin, or to certain substances synthesized in the roots which act like auxins or anti-auxins or which influence the synthesis or inactivation of these compounds. Other effects of the leafless stock on the leafy *K. quartiniana* scion were shortening of the pre-floral period and increased intensity of flowering.—Inst. Bot., Lisbon.

Roses.

(*See also* 974b, p.)

930. LEROY, A.
Méthode pour la description des variétés horticoles (appliqué aux variétés de roses.) **(Methods of describing horticultural varieties as applied to roses.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

The aim is: (1) to set down with complete clarity the individual characters of the plant in question, (2) to make a standardized description suitable both for national and international use, (3) to help in the establishment and use of plant patents. The author gives [in the summary] a 2-page chart for application to roses.

931. KORDES, W.
Immunitätszüchtung bei Rosen. **(Breeding for immunity in roses.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

The search for a rose bearing good compact blooms and resistant to the fungi common on roses continues. The factor which provides resistance is to be found in the protoplasm. Fungi have during the centuries accustomed themselves to *Rosa gallica* and *R. odorata* hybrids. Crossing with *R. multiflora* has introduced rust resistance and the addition of *R. moschata* genes the desired immunity to mildew and black spot.—Sparrieshoop i.H., Germany.

932. LEROY, A.
Les porte-greffes du rosier et leur influence.
(Rose rootstocks and their influence.)
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

An account of trials established in 1951 and observed in 1952, 1953 and 1954 in a nursery of the Parc de Sceaux, near Paris, on the following rootstocks: *Rosa canina*, *R. canina* Jaëger Bataillon, *R. rubiginosa*, *R. manetti*, *R. laxa*, *R. polyantha inermis*, *R.* multiflore de la Grifferaie, *R.* × *froebeli* × *indica-major*, *R. indica-major*, *R.* Docteur Huey (Shafter) and *R.* gloire des rosomanes. The aim was to study the effects of different stocks on the characters and growth of different rose varieties.—Bois de Boulogne, Paris.

933. FLOOR, J.
Symposium over rozenonderstammen. I. Problemen bij de selectie van rozenonderstammen. **(Symposium on rose rootstocks. I. Problems in the selection of rose rootstocks.)** [English summary 6 lines.]
Meded. Dir. Tuinb., 1955, **18**: 706-10, bibl. 3.

A trial was started in 1953 with 6 varieties on 12 stocks, namely *Rosa canina* seedlings, 8 German strains of *R canina*, and seedlings of *R. rubiginosa*, *R. multiflora* and *R multiflora japonica*. The strongest growth in the first year was made by plants on the *canina* strain Pollmers. The *multiflora* and *multiflora japonica* stocks generally produced rather weaker growth, followed by the Kauth and Heinsohns strains of *canina*. The weakest growth occurred on the *canina* seedlings, and the strains Bröggs and Pfänder. The *canina* strains Schmidts Ideal and Senff produced moderate growth. Hardwood cuttings of *R. canina* gave an average strike of 63%. The best results were from Pfänder and Kauth with 80% strike.—Inst. Vered. Tuinbouwgewass., Wageningen.

934. ASTREGO, J. J.
Symposium over rozenonderstammen. II. Teelt van rozenzaailingonderstammen. **(Symposium on rose rootstocks. II. The cultivation of rose seedling rootstocks.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1955, **18**: 710-18, bibl. 4.

New methods for stratification and sowing density and new varieties are discussed, which will probably result in changes in the old methods of raising rose stocks in Holland.

935. DORSMAN, C.
Symposium over rozenonderstammen. III. Ervaringen in het centrum Boskoop. **(Symposium on rose rootstocks. III. Experience at Boskoop.)** [English summary 11 lines.]
Meded. Dir. Tuinb., 1955, **18**: 719-23, bibl. 2.

As a result of the moist peaty soil at Boskoop only rootstocks propagated from winter cuttings are used for rose budding. Bush roses are chiefly budded on *Rosa multiflora japonica* and on the Boskoop *R. rugosa*. This latter stock is much used for standard roses and *R. multiflora* Klijn Superba to a lesser extent. Dwarf roses are budded on the relatively weak *R. multiflora*.

936. WASSCHER, J.
Symposium over rozenonderstammen. IV. Proeven met onderstammen bij kasrozen. **(Symposium on rose rootstocks. IV. Experiments with rootstocks for glasshouse roses.)** [English summary 10 lines.]
Meded. Dir. Tuinb., 1955, **18**: 724-9.
Experiments with rootstocks of greenhouse roses.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Trials were carried out at Aalsmeer with 3 rose varieties and 13 rootstocks, and their behaviour after 3 years was recorded. *Rosa multiflora* was not a satisfactory rootstock for the varieties used, as the flower colour tended to fade, and there was some incompatibility. *R. canina* var. Bröggs and *R. rubiginosa* gave good results, especially with the red varieties. *R. laxa* gave good results with some yellow roses.—Rijkstuinbouwcons., Aalsmeer.

937. ARHIPOV, F.
Propagation of roses by cuttings. [Russian.]
Sad i Ogorod, 1955, No. 10, pp. 98-9, illus.

In the Crimea cuttings of past season's growth can be taken from 20 January to 20-25 February and immediately rooted in frames, but further north they should be gathered before the frost sets in and then stored in moist sand at 5-8° C. As a rooting medium a 8-10 cm. layer of 60% peaty soil + 40% sand is covered with a 20cm layer of coarse sand which has been washed with water and then with 0·005% solution of manganese. The frames used for propagation should be disinfected with 1% solution of iron sulphate.

938. KIPLINGER, D. C., AND HARAMAKI, C.
Production of malformed rose flowers is not inherited.
Ohio Fm and Home Res., 1955, **40**: 55, illus.

Investigations on the Better Times variety showed that "bullheading", of which the cause is unknown, is not an inherited trouble arising from the development of mutations. In the production of malformed flowers individual plants showed very little consistency from one year to the next.

939. LYLE, E. W.
The occurrence and control of powdery mildew, rust, and black spot diseases of roses in the U.S.A.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The author notes that the diseases *Sphaerotheca pannosa* var. *rosae*, *Phragmidium mucronatum* and *Diplocarpon rosae* depend on climatic conditions for their development. Sulphur compounds have figured largely in the control of all three. Their application is here described.—Texas Rose Res. Foundat. Inc., Tyler, Tex.

940. MCCLELLAN, W. D., SMITH, F. F., AND TAYLOR, E. A.
Control of blackspot of roses with dust combinations containing fungicides, insecticides, and miticides.
From abstr. in *Phytopathology*, 1955, **45**: 465.

In 1954 29 dust combinations were tested on 5 rose varieties in 120 field plots. Zineb was used alone or in combination with 1·5% Aramite. All other fungicides were used alone or in combination with 1·5% Aramite, 1·5 Ovotran, or 4% malathion. Yield differences due to fungicidal treatment were not significant for the blackspot-resistant variety Red Radiance, but they were statistically significant for the blackspot-susceptible varieties Chief Seattle and Golden Masterpiece. Both the number of flowers and the average weight per flower were reduced by blackspot (*Diplocarpon rosae*). [See also *H.A.*, 25: 4239.]

Other trees and shrubs.

(*See also* 124, 863, 864, 865w, 974d, e, h, v.)

941. REISAETER, O.
Cultivated garden trees and shrubs north of the Arctic Circle in Norway.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The Gulf stream makes the winter temperature of the coastal parts of Northern Norway surprisingly high. Relevant literature is cited and an account is given of the results of a tour of observation. Some 27 trial areas have now been established there.—Inst. Dendrol. Planteskuledrift, Vollebekk, Norway.

942. DEERING, R. B.
Effective use of living shade.
Calif. Agric., 1955, **9**(9): 10-11, 15, illus.

It was shown that dense shade could reduce room temperature in houses by as much as 20° F. The best arrangement for living shade is to plant high-branching deciduous trees relatively near the house on the east and south to provide vertical shade control in morning and afternoon, and low-branching trees on the north and west to provide horizontal shade in late afternoon and early evening. [See also *H.A.*, 25: 803.]—Univ. Calif., Davis.

943. FLEMION, F.
Physiological and chemical changes occurring prior to, during and subsequent to germination of some rosaceous seeds.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

And how to obtain normal seedling development in seedlings of certain rosaceous species, *Prunus persica*, *Rhodotypos kerrioides* and others, raised from seed which has not undergone adequate pre-chilling.—Boyce Thompson Inst. Yonkers, N.Y.

944. HANGER, F. E. W.
Propagation of hard wooded plants by air layering.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The aid of growth substances seems essential. The best results have resulted from the treatment of matured, one-year-old wood in early April in southern England [see also *H.A.*, 24: 1794]. Plastic film 4, 5 or 6 thousandths of an inch in thickness is ideal for binding. Air layers which form fleshy roots need potting before planting out. Fibrous rooted layers do not. No growth substance has yet been found to aid the rooting of air layers of the very large-leaved rhododendrons.—R.H.S. Gardens, Wisley.

945. DOWNS, R. J.
Photoperiodic growth responses of seedlings and cuttings of several woody plants.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxi.

Rooted cuttings of *Weigela florida* var. Variegata and seedlings *Catalpa bignoniodes*, *Acer rubrum* and *Ulmus americana* were grown in various photoperiods. Expansion of new leaves stopped in short (8-hour) photoperiods and continued in long (16-hour) photoperiods. *Weigela* cuttings in short photoperiods stopped elongating and produced a large terminal bud. The axillary buds enlarged markedly and the internodes appeared to become mature. The leaves did not absciss, but became leathery and showed tip and marginal burn. *Catalpa* and *Acer* seedlings also stopped elongation in short photoperiods. *Ulmus* seedlings required longer treatments of short photoperiods than the other species to stop elongation. The terminal and enlarged axillary buds of *Weigela* formed under short photoperiods resumed growth after 10 days in long photoperiods. With *Catalpa* growth was not resumed in long photoperiods. When leaves were removed from *Weigela* bud growth quickly followed regardless of photoperiod, but under short photoperiods this growth was arrested as soon as the leaves expanded. Leaf removal from *Catalpa* did not result in bud growth.—Plant Ind. Stat., Beltsville, Md.

946. WASSCHER, J.
Spreading of the flowering-time with forcing shrubs by cold-treatment.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Storage temperature treatments of shrubs whereby their time of flowering can be spread over a long period are described.—Exp. Stat. Floriculture, Aalsmeer, Netherlands.

947. DEKOCK, P. C., AND HALL, A.
The phosphorus-iron relationship in genetical chlorosis.
Plant Physiol., 1955, **30**: 293-5, bibl. 17.

Yellow, variegated and green leaves were taken from variegated species of *Abutilon*, *Bougainvillea*, *Pelargonium*, *Ilex*, *Spiraea* and *Sambucus*, and were analysed for Fe, P, Ca and K. In chlorotic leaves of these plants the P/Fe ratio was higher, and the Ca/K ratio was lower than in normal green leaves.—Macaulay Inst. Soil Res., Aberdeen.

948. MEYER, F. G., BENEDICT, R. A., AND KOCH, G.
Use of antibiotics in control of ornamental plant diseases.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Includes a report of experiments in which Agrimycin (streptomycin + Terramycin) controlled fireblight on flowering quince, cotoneaster and pyracantha species.—Mo bot. Gdn, St. Louis.

949. CARTER, J. C.
Treatment of the wetwood disease.
Amer. Nurserym., 1955, **102**(9): 11-12, 86-7, illus.

Wetwood is a bacterial disease [*Pseudomonas* sp.] of the heartwood and older sapwood of trees, occurring in elm, maple, mulberry, oak, poplar and willow. Gas is produced by diseased tissues, which forces an alkaline sap out through wounds or weak branch crotches. This sap (flux) prevents or retards callus formation and may also kill the cambium. The oozing becomes apparent in June or July and leaves of affected trees turn yellow, wilt and fall. A hole may be bored in the affected tree to drain the sap. Feeding may help the tree to overcome the adverse effects of the disease. All dead wood should be removed in the spring.

950. ZECK, E. H.
The pine weevil (*Aesiotes leucurus*). Cypress pine buprestid beetles (*Diadoxus erythrurus* and *D. scalaris*).
Agric. Gaz. N.S.W., 1955, **66**: 295-6, illus.

The cypresses (*Cupressus* and *Callitris* spp.), the common pine (*Pinus radiata*) and the Aleppo pine (*P. halepensis*) are commonly used in New South Wales as ornamentals and as orchard windbreaks. All are subject to attack by the weevil borer, *Aesiotes leucurus* and the cypresses may also be damaged by *Diadoxus* beetles. The biology of the pests is outlined. For control affected bark or limbs should be cut away, the larvae or pupae in them destroyed and the wounds painted. Bluestone paint applied to trunks and limbs in the spring may also act as a deterrent.

951. SHANKS, J. B., LINK, C. B., AND PRESTON, W. H., JR.
Some effects of mineral nutrition on the flowering of azaleas in the greenhouse.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 441-5, bibl. 2.

Azalea plants, varieties Hexe, Gardenia Supreme and Vervaeneana, were given fertilizer treatments consisting of 27 factorial combinations of 3 levels of N, P and K. Increases in N resulted in more flowers per plant on all three varieties tested and in larger flowers on Gardenia Supreme and Vervaeneana. The increased number of flowers was due mainly to a greater number of flowering stems per plant and to a lesser degree to the number of flower buds per stem and the number of flowers per bud. The lowest levels of P and K were adequate for the best flower production, while the higher levels resulted in fewer flowers per plant for the variety Vervaeneana. P had no effect on flower size, but the highest level of K resulted in smaller flowers than the lowest level with the variety Vervaeneana.—Univ. Md, College Park.

952. PÉNZES, A.
Biota tanulmányok. (**Studies on *Biota orientalis*).** [English and Russian summaries ½ p. each.]
Agrártud. Egy., 1951 (issued 1953), **15** (2, Part 2): 93-8, illus.

The great variability in cone form shown by *B. orientalis* growing in Hungarian gardens is stated to be due to the wide natural distribution of the species in Asia with consequent development of subspecies. It is considered that the type carrying cones with broad scales represents older forms, and that the genus is a descendant of *Thujopsis* and not *Thuja*.

953. GLASER, W.
Rationelle Buddleien-Vermehrung. **(Practical buddleia propagation.)**
Gartenwelt., 1955, **55**: 273, illus.

The period for producing saleable buddleia plants from cuttings may be reduced by taking cuttings from forced mother plants during the winter. Batches of cuttings were taken during February and potted up when rooted. The young plants were planted out in May and were ready for sale by the autumn.

954. KIMBROUGH, W. D., AND HANCHEY, R. H.
The effect of several materials on soil pH and the growth of small camellia plants.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 436-8, bibl. 1.

Silt loam with a natural pH of 5·9-6·6 was treated with acidifying materials (aluminium sulphate, ammonium sulphate, phosphoric acid, sulphur and zinc sulphate) and with lime, and the responses of 4 varieties of camellia growing in it were observed. Good growth and flower production was obtained over a wide range of soil pH. Heavy applications of aluminium sulphate were not injurious. Ammonium sulphate used at the rate of 1 lb. per sq. yd. caused severe damage to the plants. There was no indication that soil pH had any effect on the colour of Mathotiana blooms.—La agric. Exp. Stat., Baton Rouge.

955. FURUTA, T.
Response of the camellia to boron.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 439-40, bibl. 1.

Camellia plants were grown in crocks containing peat moss-clay loam or peat moss-sandy loam mixtures. These were treated either with borax at the rate of 0, 5, 10, 20, 40 or 80 lb. per acre or with chicken manure containing Polybor 3 at the rate of 0, 1, 2, 4 or 8 tons per acre. Symptoms of B toxicity appeared 3 months after treatment, but only on the plants in sandy loam which had received the 2 highest rates of application of either borax or the manure. No toxicity symptoms appeared on plants growing in clay loam until 6 months after treatment and then only with borax at the 80 lb. rate. Symptoms of B toxicity are described and the B contents of the leaves are tabulated. Plants showing toxicity symptoms in the year of treatment made normal growth the following year.—API agric. Exp. Stat., Auburn, Alabama.

956. GODLEY, E. J.
Breeding systems in New Zealand plants. I. *Fuchsia*.
Ann. Bot. Lond., 1955, **19**: 549-59, bibl. 17, illus.

The three New Zealand *Fuchsia* species have heteromorphic flowers previously described as heterostyled. *F. excorticata* and *F. perscandens* are shown to be gynodioecious and *F. procumbens* trioecious. The frequencies of the two forms in several populations of *F. excorticata* are given. [Author's abstract.]—D.S.I.R., Christchurch.

957. MATTOON, H. G.
Hardiness in hollies.
Nat. hort. Mag., 1955, **34**: 185.

Ilex opaca cuttings of 17 female and 2 male clones from 9 states were planted at Arlington, Vermont.

Their survival rate suggests that the origin of an American holly clone has a direct bearing on its hardiness.

958. Pease, R. W.
Growing American holly for ornamental planting.
Sci. serves your Fm, Summer 1954, pp. 5, 7-8, illus.

Cuttings taken in August of 2 erect-growing female holly selections, Ridgeway and Brooks, showed 100% and 96% rooting. The following April the young plants were transplanted to a shaded, sprinkler-irrigated frame or to a non-irrigated, mulched plot. Both lots received 2 lb. 5-10-10 fertilizer per 100 sq. ft. Irrigated cuttings of the 2 selections grew to average heights of 14·5 and 13·5 inches in the first season, while non-irrigated cuttings grew to 5·0 and 4·5 inches. In the second season, the young plants were set in the field and mulched and fertilized. The Ridgeway plants developed many laterals and a compact symmetrical form, but the Brooks plants produced few laterals.—W. Va agric. Exp. Stat.

959. Pease, R. W.
Rooting holly cuttings in a window box.
Circ. W. Va agric. Exp. Stat. **97**, 1955, pp. 20, illus.

This leaflet gives clear and precise instructions to the amateur who wants to raise his own holly trees from cuttings. The wooden window box measures 11 × 12 × 16 inches; the upper part forms a framework which is sealed by a polyethylene film. Full details of its construction are given in an appendix. Recommendations include: taking current-year's shoots in August, using IBA as a rooting hormone and a mixture of peat moss, sphagnum moss and sand as a rooting medium, and watering twice a week. The cuttings are hardened off by sinking the window box, without its cover, in a well-drained, insulated hole outside; a burlap covering may be used in severe weather.

960. Crossley, J. H.
Instructions for cutting, dipping, packing and shipping holly.
[*Mimeo. Publ.*] *Saanichton exp. Stat., B.C.*, revised 1954, pp. 2.

Experimental work at Saanichton is used as a basis for recommendations regarding holly marketing. Most B.C. holly is marketed about the second week in December. After cutting and just before packing the holly should be dipped in an NAA solution to prevent leaf drop and then drained and packed while still damp in a moisture-proof container. Wax-lined cartons are the most satisfactory containers, and are used in 2, 3, 5 and 10 lb. sizes. Untreated holly should not be packed with treated holly. The grading and packing system of a local growers' association is described.

961. Piringer, A. A., and Stuart, N. W.
Responses of hydrangea to photoperiod.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 446-54, bibl. 4, illus.
Stuart, N. W., Piringer, A. A., and Borthwick, H. A.
Responses of hydrangea to photoperiod.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Merveille and Engel's White hydrangeas were grown and forced at various photoperiods from 8 to 24 hours daily. Flower buds were ultimately initiated on plants at all photoperiods at a minimum temperature of 21° C. Increasing the photoperiod with low-intensity artificial light from 8 hours to a maximum of 18 hours daily progressively increased plant height and stem length during the growing period. These increases were due primarily to greater internode length. Continuation of the same treatments during forcing after cold storage produced the same general trends. Plants forced at natural day lengths were influenced to some extent by the photoperiodic treatment before forcing, but in general their growth was similar to that of plants grown and forced at relatively short photoperiods. Photoperiod had no effect on the forcing response of plants not given cold storage treatment. Continuous light treatment had the same effect as interrupted night treatment in producing maximum vegetative growth, delayed flowering of both varieties and deleterious flowering responses in Merveille. [From authors' summary to first paper.]—U.S. Dep. Agric., Beltsville, Md.

962. Singh, S. N., and Bhatnager, G. S.
Inducing rooting in stem cuttings of *Jasminum grandiflorum*.
Sci. and cult., 1955, **21**: 210-12, bibl. 2, illus.

Growth substances alone and in mixture were tested for rooting hardwood and softwood cuttings of *Jasminum grandiflorum* using the quick-dip method. With hardwood cuttings 1000 p.p.m. β-IAA gave the best rooting, viz. 90% compared with 30% in the controls, and increased the average number and length of the roots. With softwood cuttings 500 p.p.m. α-NAA gave the best rooting, viz. 90% compared with 30% in the controls, and a much greater average number and length of roots.—Nat. bot. Gdns, Lucknow.

963. Doorenbos, S. G. A.
Lilacs and their cultivation in the Netherlands.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Notes are given on lilacs used in Dutch parks and gardens and on the most interesting cultivars.—Div. Public Parks, The Hague.

964. van Katwijk, W.
Ringvlekkenmozaïek bij seringen in Nederland. **(Lilac ringspot in the Netherlands.)**
[English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 823-8, bibl. 11, illus.

Symptoms of a ringspot disease of lilac observed in Dutch nurseries are described. Transmission is mainly by grafts, and it is important to select healthy plants in the nursery.—PlZiekt. Dienst, Wageningen.

965. Brierley, P.
Dodder transmission of lilac witches'-broom virus.
Plant Dis. Reptr, 1955, **39**: 719-21, bibl. 2, illus.

The lilac witches'-broom virus is graft-transmissible from lilac to lilac and from *Vinca rosea* to Vinca; it is also transmissible from lilac to Vinca by two species of dodder, *Cuscuta campestris* and *C. subinclusa*; no other host plants are known. [Author's abstract.]—U.S. Dep. Agric., Beltsville, Md.

966. Lerch, V.
Neue Wege der Magnolia-Vermehrung. **(New methods of propagating magnolia.)**
Gartenwelt, 1955, **55**: 332.

Magnolia cuttings of about 3 internodes were taken between mid-June and the end of July, at the start of lignification, and their leaves were cut in half. The cut ends were immersed in a warm (20° C.) solution of growth substance for 24 hours, the best results being obtained with IAA or its sodium salt. The cuttings were potted in a mixture of 1 part of peat to 3 parts of sand and kept in a closed frame, with bottom heat at 24-26° C. Rooting took place in about 6-9 weeks, the percentage varying between 74 and 88%. *Magnolia soulangeana* and its variety *alexandrina* gave very good results; *M. stellata*, *M. stellata rosea* and *M. parviflora* gave less good results, and very poor rooting was obtained with *M. tripetala*.

967. Samantarai, B.
A note on the induction of roots on the twigs of *Magnolia grandiflora* L., with the aid of synthetic hormones.
Indian J. Hort., 1955, **12**: 32-3, bibl. 6.

Stem cuttings of *Magnolia grandiflora* did not respond to IAA or IBA treatments or to aqueous solutions of NAA. Stem pieces, which were ringed but remained attached to the plants, produced many roots when treated with an alcoholic solution of NAA. Root initials were apparently initiated in some isolated cuttings and also in attached, unringed twigs treated with alcoholic solutions of NAA, but roots did not develop, owing, it is thought, to inadequate food supplies.—Ravenshaw Coll., Cuttack-3.

968. Sax, K., and Johnson, A. G.
Induction of early flowering of ornamental apple trees.
J. Arnold Arbor., 1955, **36**: 110-14, bibl. 6.

Buds from a fruiting apomictic hybrid between *Malus sargenti* and *M. astracanica* and from its young seedlings were budded on uniform clonal dwarfing stocks. After 3 years all the trees from the "old" buds had flowered, but none from the "young" buds. It is suggested that a flower-stimulating substance was transmitted by buds of the fruiting tree but not by its apomictic seeds.

969. Frey-Wyssling, A., Zimmermann, M., and Maurizio, A.
Über den enzymatischen Zuckerumbau in Nektarien. **(Enzymatic sugar conversion in nectaries.)**
Experientia, 1954, **10**: 490-2, from abstr. in *Bee World*, 1955, **36**: 214.

Nectaries of *Euphorbia pulcherrima* secrete small quantities of invertase, the process being less dependent on environmental conditions than is the secretion of sugars. When the nectaries were floated on a 5% solution of any one of the sugars glucose, fructose or sucrose, paper chromatograms (and for glucose, radioactive measurements with C^{14}) showed that they converted some of that sugar into the other two. It is therefore concluded that secretion by the nectaries is an active process, and not merely an exudation of phloem sap.—Pflanzenphysiol. Inst. E. T. H., Zürich.

970. Haviland, E. E., and Highland, H. A.
The phytotoxicity of malathion to poinsettias.
J. econ. Ent., 1955, **48**: 326.

Applications of malathion emulsion just before or during flowering, at concentrations necessary for mealy bug control, injured poinsettias, indicating that the emulsifiable concentrates can be used safely only in the dormant period. Treatments with wettable powder during the growing period resulted in less injury but left a residue which spoiled the appearance of the plants.—Md. agric. Exp. Stat., College Park.

971. Frisbie, L. F.
***Rhododendron macrophyllum* D. Don ex G. Don.**
J. Arnold Arbor., 1955, **36**: 115-17, bibl. in text.

The only *Rhododendron* species with persistent leaves, which is native to the west coast of North America, should be called *R. macrophyllum. Rhododendron californicum* is a synonym but is of later origin.

972. Creech, J. L.
An embryological study in the *Rhododendron* subgenus Anthodendron Endl.
Bot. Gaz., 1955, **116**: 234-43, bibl. 17, illus.

Intraspecific and reciprocal pollinations were made with *Rhododendron japonicum* and *R. mucronatum*, and pistils were collected at established intervals after pollination. This material was sectioned and examined to observe rate of pollen-tube growth, fertilization and subsequent seed development. [From author's summary.]—U.S. Dep. Agric., Beltsville, Maryland.

973. Zimmermann, M.
Über die Sekretion saccharosespaltender Transglukosidasen im pflanzlichen Nektar. **(Secretion in plant nectar of a transglucosidase which breaks down sucrose.)**
Experientia, 1954, **10**: 145-6, from abstr. in *Bee World*, 1955, **36**: 214.

The phloem sap of *Robinia pseudoacacia* contains only sucrose and has no invertase activity. However, nectar from the flowers contains a sucrase, which liberates more fructose than glucose from sucrose and also produces oligosaccharides; it is identified as a transglucosidase. Enzymatic activity apparently commences 2-5 days before the flowers are fully open.—Pflanzenphysiol. Inst. E.T.H., Zürich.

Noted.

974.

a Allwood, M. C.
Modern carnations and pinks.
J. roy. hort. Soc., 1955, **80**: 475-83, illus.

b Andersen, G.
Die Sortenbewegung bei Rosen unter Glas. **(Varietal changes in roses under glass.)**
Arch. Gartenb., 1955, **3**: 22-47, bibl. 51.
Changes in varieties grown in Germany during past 50 years surveyed.

c ANON.
Primula acaulis vorbeugend gegen Blattflekkenkrankheit behandeln. **(Prophylactic treatment for leaf-spot of *Primula acaulis*.)**
Schweiz. Gärtnerztg, 1955, **58**(35): 2, illus.
Ramularia primulae control by 0·2% M555, an organic fungicide.

d ANON.
Success with peonies.
Circ. Wis. agric. Ext. Serv. **494**, 1955, pp. 5.
Planting, culture, diseases, pests and varieties.

e BARRET, J.
Arbustes à feuillages argentés pour les bords de mer. **(Silver-leaved shrubs for planting near the sea.)**
Rev. hort. Paris, 1955, **127**: 1315.
Atroplex halimus, *Baccharis halimifolia*, *Eleagnus* spp., *Halimodendron argenteum*, *Hippophae rhamnoides*, and *Shepherdia argentea*.

f BEHRENS, W.
Wanderndes Glas im Zierpflanzenbau. **(Moveable glass in floriculture.)**
Gartenwelt., 1955, **55**: 265-6, illus.
Rotation schemes for moveable frames and glasshouses.

g BRANDALL, J. H.
Penstemon cultivation.
Gdnrs' Chron., 1955, **138**: 105.
Raising plants from cuttings or seed.

h BROERTJES, C.
The forcing of *Forsythia intermedia spectabilis* Khne.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
Cold treatment; methods discussed.—Exp. Stat. Arboric., Boskoop.

i CATHEY, H. M.
Temperature guide to chrysanthemum varieties.
Bull. N.Y. St. Flower Grs. 1955, No. 119, pp. 1-4, bibl. 1.
For another account see *H.A.*, 25: 4189.

j DUFRENOY, M.-L., AND DUFRENOY, J.
La panachure infectieuse des tulipes: histoire des tulipes perroquet. **(Infectious mottling on tulips: history of parrot tulips.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
A fascinating tale of suspect beauty.—Conserv. nat. Arts Métiers, Paris.

k HAAGE, W.
Richtige Gattungsnamen der Echinocacteen. **(Correct generic names for Echinocacteae.)**
Dtsch. Gartenb., 1955, **2**: 236-8, illus.
A survey, with brief descriptions, of genera.

l HEINZE, K., AND KUNZE, L.
Die europäische Asterngelbsucht und ihre Übertragung durch Zwergzikaden. **(European aster yellows and its transmission by leaf hoppers.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 161-4, bibl. 12, illus.
Transmitted to *Vinca rosea* as well as aster.

m HOLLINGS, M.
Aspermy virus and flower distortion in chrysanthemums.
Agriculture, Lond., 1955, **62**: 275-7, illus.
For a more detailed account see *H.A.*, 25: 3093.

n JOHNSON, B. L., AND BARNHART, D.
Double-flowered column stocks.
Calif. Agric., 1955, **9**(9): 7, 16, illus.
Genetical aspects [see also *H.A.*, 25: 4268v.]

o JOHNSTONE, F. E., JR.
Protection of ornamentals against unseasonable cold spells.
Amer. Nurserym., 1955, **102**(7): 16, 52-6.

p KALLAUCH, —.
Eine neue gelbe Treibrose? **(A new yellow rose for forcing?)**
Description of Tawny Gold.

q KAMMEYER, H. F.
Neue *Heliopsis*-Sorten. **(New *Heliopsis* varieties.)**
Dtsch. Gartenb., 1955, **2**: 269-70, illus.
Spitzentänzerin, Goldgrünherz and Goldgefieder.

r KLUTH, A.
Neue *Cyrtanthus*- Hybriden. **(New *Cyrtanthus* hybrids.)**
Gartenwelt, 1955, **55**: 229-30, illus.
C. parviflorus × *C. mackennii.*

s KRÜSSMANN, G.
Methodik der Sortimentsprüfung bei Ziergehölzen. **(Methods adopted for evaluating ornamental shrubs in Germany.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

t MAATSCH, R.
Die Bedeutung der heimatlichen Standortsbedingungen für die Kultur von Zierpflanzen unter Glas. **(The importance of natural conditions in the cultivation of ornamentals under glass.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
A discussion on natural environments and the ways man can improve on them.—Tech. Hochsch., Hanover.

u MARTIN, R. W., AND SMITH, F. H.
Megagametophyte development in *Chrysanthemum leucanthemum* L.
Bot. Gaz., 1955, **116**: 243-9, bibl. 16, illus.

v MENNINGER, E. A.
The geiger tree and its relatives in Florida.
Nat. hort. Mag., 1955, **34**: 159-62, illus.
Notes on 13 *Cordia* spp. grown in Florida.

w de Mol van Oud Loosdrecht, W. E.
Die Kohlensäure-Sauerstoff-Druckmethode zur Bekämpfung der Grossen Narzissenfliege (*Lampetia equestris* F.). II. Das Töten der Made und der Zustand der Zwiebeln bei Anwendung der Kohlensäure-Sauerstoff-Druckmethode (1939-1941). **(The control of the large narcissus fly by the carbon-dioxide-oxygen-pressure method. II. The killing of the grub and the state of the bulb on application of the carbon dioxide-oxygen-pressure method, 1939-1941.)**
Z. angew. Ent., 1955, **36**: 334-57, from abstr. in *Z. PflKrankh.*, 1955, **62**: 481-2.
For another account of the method see *H.A.*, 24: 2967.

x Naegele, J. A.
Red spider continues as No. 1 pest.
Flor. Exch., 1955, **125**(14): 17.
Control of resistant strains of mites and other pests on flower crops reviewed.

y New South Wales Department of Agriculture.
Gladiolus culture.
[*Publ.*] *N.S.W. Dep. Agric.*, 1955, pp. 6, illus.

z Pape, H.
Beizversuche an Blumenzwiebeln und -Knollen. **(Chemical treatment of bulbs and corms.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
German work reviewed.—Lab. gärtn. Pflanzenb. biol. Bundesanst. Kiel-Kitzeberg, Germany.

975.

a Penningsfeld, F.
Grundlagen der Zierpflanzenernährung. **(Fundamentals of the nutrition of ornamental plants.)**
Reprinted from *Süddtsch. ErwGärtn.*, 1955, Vol. **9**, No. 31, pp. 4.

b Perry, F.
Bog and moisture-loving plants.
J. roy hort. Soc., 1955, **80**: 467-74, illus.
And the making of bog gardens.

c Saanichton.
Gladiolus culture in British Columbia.
Mimeo. Saanichton exp. Stat., B.C. **158**, 1955, pp. 14, bibl. 4.
Advice on culture, varieties and pest and disease control.

d Samusev, F. F.
Hardiness of lilies. [Russian.]
Sad i Ogorod, 1955, No. 8, pp. 72-3, illus.
Lilium tigrinum, *L. regale*, *L. willmottiae* and *L. dauricum* are hardy.

e Scholten, G.
Meeldauw bij bloemisterijgewassen. **(Powdery mildew on flower crops.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 681-91,
Occurrence and control in Holland.

f Seyffert, W.
Die Genetik der Cyclamenfarben. **(Genetics of cyclamen colours.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
Studies at Inst. Vererb. Züchtungsforsch., Berlin-Dahlem.

g Seyffert, W.
Die Vererbung der Blütenfarben bei hemiploiden Cyclamen. **(The inheritance of flower colour in hemiploid cyclamen.)**
Züchter, 1955, **25**: 275-87, bibl. 32, illus.

h Sirdeshmukh, K. B.
Occurrence of a regular flower of *Clitoria ternatea*.
Sci. and Cult., 1955, **21**: 210, illus.

i Steffen, L.
Kleinblumige Kieler Duft-Cyclamen. **(Small-flowered scented cyclamen from Kiel.)**
Gartenwelt., 1955, **55**: 271-2, bibl. 1, illus.
Selected seedlings of *Cyclamen persicum* Kätchen Stoldt × *C. aleppicum* var. *puniceum*.

j Stoutemyer, V. T.
Container nursery stock in California.
Amer. Nurserym., 1955, **102**(6): 38-52.
Methods of raising and marketing nursery stock in containers.

k Strydom, J. C.
The cultivation of dahlias.
Fmg S. Afr., 1955, **30**: 321-6, bibl. 1, illus.
Notes are given on types, propagation and culture.

l Trotter, W. K.
Problems in marketing florist crops.
Diss Abstr., 1955, **15**: 918, being *Publ.* 12286 of 293 pp.
A survey for the U.S.A.

m Ueno, K., and Kawaguchi, T.
On the American varieties of *Lilium longiflorum*. [Japanese, with English summary ⅓ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 78-84, bibl. 3, illus.
Characters, disease susceptibility and forcing behaviour of 4 varieties, including Croft.

n Wellensiek, S. J.
The genetics of diploid × tetraploid and reciprocal cyclamen crosses. [German summary 15 lines.]
Züchter, 1955, **25**: 229-30, bibl. 3.

o Werckmeister, P.
Über eine chemische Methode, dominant-weisse und rezessiv-weisse hohe Garteniris zu unterscheiden. **(On a chemical method of differentiating between dominant-white and recessive-white garden irises.)**
Züchter, 1955, **25**: 315-19, bibl. 9.

SUB-TROPICAL FRUIT AND PLANTATION CROPS

Avocadoes.

(*See also* 91, 1068a.)

976. DE LA ROCHA G., G. AND FLORES C., D.
Ensayo de absorción de nitrógeno por las hojas (abonamiento foliar). **(Tests on nitrogen foliar nutrition.)**
Inf. mens. Estac. exp. agric. La Molina, 1955, **29** (332): 5-9.

Foliage spraying with Nugreen slightly improved leaf and fruit size and leaf colour in strawberries and in young avocadoes and oranges, but had no such effects on mangoes, though it increased the leaf content of N.

977. SCHROEDER, C. A.
Proliferation of mature fruit pericarp tissue slices *in vitro*.
Science, 1955, **122**: 601, bibl. 3, illus.

It has been found that cell division in the pericarp continues throughout the life of avocado fruits on the tree [see *H.A.*, 24: 746]. In order to investigate further this continuous meristematic condition of the otherwise mature pericarp parenchyma, disks of tissue from the pericarp wall of ripe fruits were cultured on agar media. Within 3 or 4 weeks cell proliferation occurred on the upper surface of the disks. This is the first demonstration of proliferation *in vitro* of pericarp tissue from horticulturally mature fruit.—Univ. Calif., Los Angeles.

978. EBELING, W.
Causes of avocado leaf injury.
Calif. Agric., 1955, **9**(8): 8-10, illus., and *Calif. Citrogr.* 1955, **40**: 431, 435-6, illus.

Illustrated descriptions are given of three types of leaf necrosis in avocado caused respectively by larvae of two moths *Amorbia essigana* and *Sabulodes caberata*, and by an unknown physiological disorder.

Citrus—production, varieties and propagation.

(*See also* 8, 1070, 1073, 1276, 1283.)

979. U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
1954/55—world citrus production.
Foreign Agric. Circ. **FCF-3-55**, 1955, pp. 9.

The upward trend in world citrus production was temporarily halted in 1954-55, due mainly to adverse weather in the Mediterranean Basin. New plantings and young trees not yet in full bearing are sufficient in most of the major producing areas to continue the upward trend in production, particularly of oranges, for several years. Citrus consumption has increased to the extent necessary to absorb the increased production at reasonable prices. If world prosperity continues, the expansion in demand may also continue.

980. CHAPOT, H., AND PRALORAN, J. C.
Citrus seeds.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

Examination of citrus varieties belonging to the genera *Poncirus, Fortunella* and *Citrus* and their intergeneric and interspecific hybrids showed that, in general, no one seed character could definitely establish the identity of a variety. Two or more of the following characters had to be examined for the purpose and in the order as given: General form of seed, colour of chalazal spot, colour of cotyledons and degree of polyembryony. Certain facts were, however, established during the examination regarding the seed characters of shaddock, citron, lemon, grapefruit, sweet and sour orange, lime and mandarin and tangerine.—Agric. Inf. Serv., Rabat, Morocco.

981. KUSKIE, S. J.
The Washington Navel orange.
Qd agric. J., 1955, **80**: 255-7, illus.

Among strains of Washington Navel developed from bud sports and grown commercially in Australia are the Leng, Bellamy and Dunning. Most trees in Queensland are worked on rough lemon and the remainder chiefly on sweet orange.

982. NORO, K.
Preliminary report on the Takagi Mikan graft hybrid of Kinkoji (Citrus *leiocarpa* Tanaka) and Satsuma orange (Citrus *unshiu* Marc.) [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 80-4, bibl. 7, illus.

A description is given of the tree and fruit characters. The fruit is flattened and of good size and appearance. The pulp resembles that of the Satsuma orange. The variety is considered commercially promising.

983. TOXOPEUS, H. J.
Breeding for resistance to "mal tristeza" in citrus.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

Little was saved from the wreck resulting from the Japanese occupation of Java of the material collected and bred in the search for stocks showing resistance to *Phytophthora* as well as absence of decline. But out of the 25 stocks which showed such resistance cuttings of 4 are now growing at the Laboratory of Tropical Agriculture, Wageningen.—Inst. agric. Plant Breed. Wageningen.

984. OSTE, C. A., AND TOLL JUBES, J.
Plantación de vivero cítrico. Primera parte. **(Establishment of a citrus nursery. Part I.)**
Circ. Estac. exp. agric. Tucumán **148**, 1955, pp. 10, illus.

Advice is given on the choice of site, water supply, climate, preparation of the soil and layout. The local sweet orange (dulce criollo) is the most frost-resistant of the recommended rootstocks followed by Cleopatra mandarin, Rangpur lime and rough lemon.

985. SINGH, S. N.
Studies on rootage of fruit plants in relation to hormones. V. Citrus fruits.
Sci. and Cult., 1955, **21**: 206-8, bibl. 4, illus.

A number of growth substances alone and in mixture in lanolin paste were tested for the rooting of citrus cuttings. With Kaghzi lime (*C. aurantifolia*) 1·0% β-IBA plus 1·0% β-IAA gave the same rooting as the control, namely 100%, and increased the average number, length and thickness of the roots. With sweet lime (*C. limettioides*) 1·0% α-NAA plus 1·0% β-IAA gave 100% rooting, compared with 60% in the control, and increased the average number and length of the roots. With grapefruit 1·0% β-IBA gave the same rooting as the control, namely 100%, and increased the average number, length and thickness of the roots.—Nat. bot. Gdns, Lucknow.

Citrus—planting, pruning and growth phenomena.

(*See also* 1068i.)

986. Greene, P. H.
Hedgerow plantings in Ventura County.
Calif. Citrogr., 1955, **40**: 438, 448-50, illus.

Close planting of citrus in hedgerows is favoured by some Californian growers. Methods of maintaining production in older orchards by interplanting are described. In one Valencia orchard thinning of the rows reduced yields by 59%. In another orchard Valencias planted at 19 × 22 ft. yielded 1580 boxes per acre in 4 years, whereas other trees spaced 9½ × 22 ft. yielded 3140 boxes during the same period.

987. Moore, P. W., and Nauer, E.
Mechanical hedging in California orchards.
Calif. Citrogr., 1955, **40**: 399, 419-24, bibl. 3, illus.

Experience over 18 months in California suggests that hedging is an inexpensive way of correcting crowded conditions in old, close-planted groves and is also of value in preventing such conditions from developing in younger groves. Opening up drives in groves has not resulted in any serious crop reduction the following season. Where additional rows have been hedged or cross-hedged yield reductions have amounted to ¼–1 box per tree the year following treatment. Timing of hedging varies with variety and locality. Regrowth in oranges from hedged side-walls is fairly rapid, and new shoots from a June hedging may bear fruit the following year. Limited tests have not indicated any increase in orange fruit size after hedging. Hedging may be expected to reduce the cost of hand pruning operations by 30 to 50%.—Calif. Citrus Exp. Stat., Riverside.

988. Taylor, O. C., and Cahoon, G. A.
Orchard rejuvenation field studies.
Calif. Citrogr., 1955, **40**: 400, 424-7, bibl. 4.

Preliminary results are given from a trial to determine the effects of inter-row soil fumigation with DD, sprinkler and furrow irrigation and a wood shaving mulch on growth and production of citrus trees. Regrowth of citrus roots into fumigated areas was only slight after one year. The mulch reduced fluctuations in soil temperature and moisture. New root growth was observed beneath and sometimes extending into the mulch. More new root growth was observed under sprinkler trees than under furrow-irrigated trees. Sprinkler irrigation tended to increase production and to reduce the soluble solids content of Washington Navels. Soil fumigation with DD reduced the production of Navels.—Calif. Citrus Exp. Stat., Riverside.

989. North, C. P., and Wallace, A.
Soil temperature and citrus.
Calif. Agric., 1955, **9**(11): 13, illus.

Low soil temperatures (48° F.-62° F.) induced foliage wilt in glasshouse experiments with several citrus species on various rootstocks. With Valencias on sweet orange in glass-sided soil boxes considerable root elongation was noted at 100° F., but roots died at 105° F. With plants on 4 different rootstocks, root growth increased from 65° to 90° F., but the ratio of top to root growth decreased with increasing temperature. Root elongation slowed down but did not stop when there was a vigorous leaf flush.—Univ. Calif., Los Angeles.

990. Cahoon, G. A., Harding, R. B., and Miller, D. B.
Root condition and production.
Calif. Citrogr., 1955, **41**: 3, 18-20, bibl. 5.

Root samples were taken to a depth of 3 feet from high and low-yielding orange groves in California. In high-producing groves the weight of feeder roots extracted from between the trees averaged 4·78 g., while those from beneath the trees averaged 5·29. In low-producing groves there were only about half as many roots in the middles (2·33 g.) as under the trees (4·04 g.). There was a highly significant correlation between the weight of roots found between the trees and their yield.—Calif. Citrus Exp. Stat., Riverside.

991. Fujita, K., and Yagi, T.
Studies on flower bud differentiation and development in some orange trees. 1. On the time of flower bud differentiation and process of flower bud development in *Citrus unshiu* Marcovitch. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 19-27, bibl. 11, illus.

An anatomical study was made of typical spring and summer shoots of two 50-year-old Satsuma orange trees. Differentiation of flower buds was first observed on March 26 and coincided with bud burst. It is presumed that induction occurred during the week preceding that date. The stages of differentiation were essentially the same in spring and summer shoots, but development appeared to be more rapid in the former.

992. Yukawa, I., Yagi, T., and Itakura, K.
Experiment on thinning buds, blossoms and fruits of Satsuma orange. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 28-35, bibl. 5, illus.

The relationship between leaf area and fruit development was investigated by thinning buds, blossoms or fruits at various stages. The best fruit quality and size (92·82 ± 4·72 g.) occurred when thinning was done to leave 1 fruit per 25 leaves with a total leaf area of 907·6 ± 17·10 sq. cm. Blossom thinning resulted in more uniform size of fruit than did bud thinning or fruit thinning, but bud thinning resulted in more bud formation the following year. Within each category of thinning early thinning gave more pronounced results than late. There were no clear differences in chemical composition between thinned and unthinned fruits, but the former generally showed better keeping quality.

993. Iwasaki, T., Ōhata, T., and Nishiura, M.
Bud pollination of Satsuma orange. [Japanese, with English summary ⅓ p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 37-41, bibl. 11, illus.

Flowers of Satsuma orange and Wase Satsuma were pollinated at different stages of maturity with pollen from Trovita orange in the years 1949 to 1951. With both varieties flowers pollinated in the bud stage produced fruit with many more seeds than those pollinated when fully open. There was little difference in the number of seeds produced by pollination 1, 2 or 3 days before blossom opening. In each case Wase Satsuma produced far fewer seeds than Satsuma orange. The results indicated that bud pollination increased fruit set compared with pollination of mature flowers.

Citrus—composition, nutrition and irrigation.

(*See also* 29, 976.)

994. Koto, M., and Takeshita, S.
Experiment on leaf analysis of Satsuma orange. I. Composition in relation to position in crown. II. Effect of fruiting on leaf composition. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 36-9, bibl. 30.

N content was highest in the upper part of the crown, lowest in the middle part and intermediate in the lower part. P content was the same in all positions. K content was the same in the upper and middle parts of the crown and was higher but less constant in the lower part. Ca content was high in the upper and middle parts of the crown and lower in the lower part, but variation between leaves in the same position was considerable, especially in the extreme upper and lower parts of the crown. Abundant fruiting reduced K content of the leaves and increased Ca but did not affect N and P.

995. Wallace, A., Cameron, S. H., and Wieland, P. A. T.
Variability in citrus fruit characteristics, including the influence of position on the tree and nitrogen fertilization.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 99-108, bibl. 18.

Tops of Valencia orange trees tended to have relatively fewer and smaller fruits than other tree portions. Washington Navel fruits from the south and top portions of the tree were smaller than those from other portions, but contained more soluble solids on both the percentage and the per-ton-of-fresh-fruit bases. Fruits having the highest soluble solids content did not always have the highest solids-acid ratio, and soluble solids and acid contents were positively correlated. Small fruits did not always have a higher juice proportion than large fruits. The percentage of juice in fruits accounted for 61% of the variability in the pounds of soluble solids per ton of fresh fruit, and the percentage of soluble solids accounted for 39% of it. An adequate sample size for assaying soluble solids content was calculated. Differences in either soluble solids or citric acid on the percentage basis, resulting from changes in nitrogen fertilization, were not always apparent on the per-ton-of-fresh-fruit basis, because variation in juice percentage was in the opposite direction to that of the other percentages. Some of the differences appeared to be independent of stage of maturity. There was a tendency for the acid content to increase slightly after fruits had reached maturity.—Univ. Calif., Los Angeles.

996. Rebour, H.
La fumure des agrumes. Essais effectués à la Station expérimentale d'Arboriculture de Boufarik (Algérie). (**Citrus manuring. Trials at the Boufarik Fruit Research Station, Algeria.**)
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

A discussion of results of experiments on the application of organic manure and of fertilizers, in conjunction with particular cultural operations including irrigation. Serv. agric., El Biar, Algeria.

997. Bouma, D.
A factorial field experiment with citrus, Farm 466. No. 5 review 1947-1954.
Internal Rep. Irrig. Res. Stat. Griffith **14**, 1954, pp. 18, bibl. 4.

The layout of the experiment and preliminary results have been described earlier [*H.A.*, 22: 2047, 4240, 4241 and 23: 1124.]. A summary of the results from 1950 onwards is as follows:—*Growth:* (1) Butt circumference is significantly smaller in the light-irrigation, alternate-bay plots than in the other 3 treatments; (2) The 2 cultivation and the bare soil treatments have produced better growth than the sod treatment. (3) Nitrogen has given no increase in the cultivation, with and without manure treatments, but has given increases in the sod treatment mainly, and in the bare soil treatment solely, because of low N; (4) Valencias have grown better than Washington Navels, and trees on sweet orange than those on rough lemon. *Yield* (number and weight of fruits per tree): (1) Yields have been slightly but not significantly greater in the heavy irrigation treatments; (2) The sod treatment trees have consistently given the lowest yields; (3) Nitrogen has produced a slight increase in both number and weight in the cultivation without manure, and in number only in the cultivation with manure treatment, but in the sod treatment low N has given very large yield increases the medium N a further slight increase; (4) Since 1950 trees on rough lemon have outyielded those on sweet orange each year.

998. El Tomi, A. L., and Wolfe, H. S.
A study of some responses of Florida citrus trees to nitrogen application and irrigation.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 113-20, bibl. 16.

The responses of both Hamlins and [Owari] Satsumas to differential nitrogen applications to the soil was generally quite similar as judged by the percentage of leaf nitrogen and by the weight of chlorophyll per unit area in the leaves of the spring flush. The high N plots always gave values of these items significantly higher than did the low N plots, but there was usually no significant difference between high and medium N. Percentage nitrogen was very high in the young leaves of the new flush, fell rapidly to a level maintained during the whole season with little fluctuation, and declined rapidly again just as the next spring flush was developing. Chlorophyll content was minimum in the new leaves, rose fairly rapidly to midsummer, and thereafter rose slowly or remained fairly constant until the end of the season, when it declined rapidly in Satsumas both years and in Hamlins the first year. Irrigation which maintained soil moisture near field capacity generally caused a decrease in both nitrogen percentage and chlorophyll in Satsuma leaves but produced no significant effect in Hamlins, presumably due to the deeper root system of the latter. Under the condition of this experiment, the effect of previous N fertilization seemed to last only one season. [Authors' summary. See also *H.A.*, 25: 2009.]—Univ. Fla, Gainesville.

999. Iwasaki, T., Oohata, T., and Hida, B.
Studies on the foliar fertilization of citrus trees. I. The effect of nitrogenous compounds. [Japanese, with English summary ¼ p.]
Iwasaki, T., Tokimoto, T., and Ōwada, A.
Ibid. II. The effect of urea applied to citrus leaves. [Japanese, with English summary 1¼ p.]
Sci. Exp. Rep. Minist. Educ. 1954, No. **16**, pp. 61-5, bibl. 32 and pp. 66-80, bibl. 28, reprinted as *Mems hort. Div. Tôkai-Kinki agric. Exp. Stat.* **17** and **18**.

In greenhouse experiments on *Citrus unshiu* and sour orange, urea sprays at 6, 3 and 1·5% all deepened the leaf colour, but the 2 higher concentrations caused leaf burn or defoliation. Other compounds tested either caused severe leaf injury or were apparently not absorbed.

Further greenhouse experiments were made in 1950/52 with 46·6% urea and Nugreen (43% urea) used in concentrations up to 2%. The main results were: (1) Late autumn treatment increased leaf N, maintained it at a higher level throughout the winter and caused newly-developed leaves to have a higher content. (2) Leaf colour deepened 3-5 days after spraying, especially in N-deficient trees, and increasing the concentration of the urea appeared to hasten the change. (3) Brushing different parts of Lisbon lemon and Sutsuma orange leaves with 2% urea deepened the leaf colour in 1-2 weeks the response varying with the parts of the leaves treated. (4) Except when heavy rainfall induced severe fruit drop, spraying during flowering increased fruit set more than did spraying at the fruitlet stage. (5) Spraying with urea in the late autumn, in contrast to equivalent soil applications of ammonium sulphate increased flower bud production in N-deficient Satsumas the following spring but decreased it in vigorous trees. (6) Fruit colouring was delayed and fruit quality reduced in N-deficient Satsumas by preharvest sprays of urea but not by equivalent soil applications of ammonium sulphate. It was concluded that 0·5–1·0% urea sprays can best be applied in June to August, in September and in November/December with only occasional cases of defoliation. The different types of leaf injury caused by urea spraying and the effects of painting and spraying parts of individual leaves and of the crown are described.

1000. Jones, W. W., Embleton, T. W., and Goodall, G. E.
Urea: source of citrus nitrogen.
Calif. Citrogr., 1955, **41**: 4, bibl. 4.
Urea as a source of nitrogen for citrus—biuret tolerance levels.
Citrus Leaves, 1955, **35**(11): 12, bibl. 4.

Navel orange trees were given soil applications of 3 lb. nitrogen in the form of urea from 4 sources, which contained 0·15, 0·78, 2·12 and 3·58% of biuret, respectively. The two lower levels of biuret did not induce any yellow-tip, the 2·12% level induced slight yellow-tip and the 3·58% level moderate yellow-tip. Lemons have so far shown no injury from spray applications of urea containing 0·15% biuret or soil applications of urea containing 2% biuret. Results to date suggest that, whereas urea containing up to 2·5% biuret may be applied to the soil with negligible risk of injury, urea used as sprays should not contain more than 0·25% biuret.

1001. Haas, A. R. C., and Brusca, J. N.
Potassium and lemon fruit size.
Calif. Agric., 1955, **9**(9): 13-14, illus.

Nutrient solutions containing 8 levels of K and Ca were supplied to young lemon trees on sour orange growing in soil in pots [see also *H.A.*, 25: 4287]. Ca levels were increased as those of K decreased in the nutrient solutions. The average diameter of the fruit, measured at the silver stage of maturity, increased as the Ca/K ratio was reduced. The concentration of Ca in the peel and pulp increased with increasing Ca/K ratios, while K content increased with decreasing ratios. Small increases in Mg in both peel and pulp accompanied an increased Ca/K ratio. The mineral content of the dry matter in lemon flowers was also affected by variations in the Ca/K ratio.—Univ. Calif., Riverside.

1002. Samson, J. A.
Bemestingsproeven bij citrus. (**Citrus manurial trials.**) [English summary ⅓ p.]
Surinaam. Landb., 1953, **1**: 247-53, and 1955, **3**: 240-8.

In trace element research on citrus it was shown that zinc sulphate applications to the soil and foliage had a good effect on Zn deficiency, the spray acting the more quickly. Differences in production between trees sprayed or manured with Zn, Cu, and Mn sulphates and control trees were not, however, significant. A major element trial was started in 1950 with NPK and Mg applied to young orange trees on a sandy soil. The number of fruits harvested per tree was highest with the complete fertilizer. A significantly lower yield resulted from K omission, and an almost significantly lower yield from Mg omission. Fruit size followed a similar trend. Young trees on a heavy clay soil received applications of N, NP (in 2 forms) and NPK. Girth measurements showed a clear response to N and to P dressings, and in 1954 control trees yielded less than treated trees.

1003. Chapman, H. D., and Vanselow, A. P.
Boron deficiency and excess.
Calif. Citrogr., 1955, **40**: 455-60, and **41**: 31-4, bibls. on request, illus.
The diagnosis, cause, and control of mineral deficiencies and excess in citrus.
Citrus Leaves, 1955, **35**(12): 6-8, 24, 26, 34-5, and 1956, **36**(1): 10-12, 26, 28, bibl. 32, illus.

These articles are the first of series on the diagnosis, cause and control of mineral deficiencies and excesses in citrus, which will later be issued as a book. Symptoms of B deficiency and excess are described and illustrated. The presence of sufficient B in irrigation water and as impurities in fertilizers may be the reason for the relatively low occurrence of deficiency in citrus. B excess is often due to the presence of more than 0·5 p.p.m. B in irrigation water or in the soil solution. There are pronounced varietal and rootstock variations in B absorption.

1004. Russo, F., and Raciti, G.
La carenza di zinco e di manganese negli agrumi. **(Zinc and manganese deficiency in citrus.)**
Riv. Agrumic., 1955, **1** (1): 29-42, illus.

This is the first of a series of notes on mineral deficiencies in citrus. A detailed description with coloured illustrations is given of Zn and Mn deficiencies. Control experiments in Sicily are described. The following sprays are recommended: (1) For Zn deficiency alone 600 g. zinc sulphate and 300 g. sodium carbonate plus adhesive per 100 l. water; (2) for Mn deficiency alone 300 g. manganese sulphate and 150 g. sodium carbonate plus adhesive per 100 l.; (3) for both together 600 g. zinc sulphate, 300 g. manganese sulphate and 450 g. sodium carbonate or slaked lime plus adhesive per 100 l. Application should be made in March, and in plantations severely affected with, but not previously treated for, Zn deficiency it should be repeated after 3-4 months. HCN fumigation should not be applied to trees for at least one growth cycle following Mn treatment. [*H.A.*, 25: 4290 relates to another version of the section on Mn deficiency.]

1005. Furr, J. R.
Responses of citrus and dates to variations in soil moisture conditions at different seasons.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The author presents data from which he draws the following conclusions: The responses of citrus and date trees to soil drought were influenced by the concentration and the depth of roots in the soil. Vegetative growth was appreciably reduced by water shortage without significant reductions in yield, but water deficits that nearly or entirely prevented growth resulted in reduced yields and other harmful effects. Yields of grapefruit were greatly reduced by water shortage during the "June drop" period, but water deficits of equal severity at other times during the year did not significantly reduce yields. Withholding water for four months in summer reduced leaf growth but not yield of dates.—U.S. Date Gdn, Indio, Calif.

1006. Erickson, L. C., and Richards, S. J.
Influence of 2,4-D and soil moisture on size and quality of Valencia oranges.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 109-12, bibl. 5.

A study is reported on the effects of soil moisture on the response of Valencia oranges to 2,4-D used as a spray to increase fruit size and quality [for a short, preliminary account, see *H.A.*, 25: 3196]. The trees, growing in sandy loam, were irrigated when the water tension in the soil reached (*a*) 300 cm. water at a depth of 1 ft., or (*b*) 700 cm. water at a depth of 2 ft. Alternate trees were sprayed with 16 p.p.m. 2,4-D when the fruit averaged 11 mm. in diameter. 2,4-D significantly reduced the number of oranges per tree in both ranges of soil moisture by eliminating many of the small fruits, but only increased the number of large fruits on trees in the moist soil. Fruit size, but not fruit number, was less on the dry than on the moist soil both in the presence and absence of 2,4-D. The percentage of rag was greater in fruit from trees on the dry soil than in that from trees on the moist soil, in the absence of 2,4-D. The accumulation of soluble solids was greater in fruit from trees in the dry soil in the presence of 2,4-D than in that from trees in the moist soil with or without 2,4-D. The ratio of soluble solids to acid was greater in fruit from trees in the dry soil than in that from trees in the moist soil, in the presence of 2,4-D. Granulation tended to be less in fruit from trees in the dry soil than in that from trees in the moist soil, but was significantly so only in the presence of 2,4-D.—Calif. Citrus Exp. Stat., Riverside.

Citrus—air pollution, diseases and pests.

(*See also* 983, 1033-1038, 1062, 1068b, d, g.)

1007. Kaudy, J. C., and others.
Contamination of citrus foliage by fluorine from air pollution in major California citrus areas.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 121-7, bibl. 22.

Leaves from approximately 130 citrus groves, representing citrus both in areas free from air pollution and in areas where air pollution occurs, were sampled for fluorine analyses. Leaves collected from non-industrial areas showed concentrations of 1 p.p.m. F or less, while leaves collected from industrial areas showed values of up to 211 p.p.m. F. The greatest F accumulation was evident in leaves from the San Bernardino Valley, especially from the vicinity of Fontana where a steel plant is located. High F values were not associated with any visible damage to the trees. Maximum accumulation of F occurred during the summer and autumn months. Foliar concentrations of F increased very little once the winter rains had begun. [For a preliminary account see *H.A.*, 24: 3068.]—Calif. Citrus Exp. Stat., Riverside.

1008. Todd, G. W.
The effect of some gaseous oxidants on plant respiration.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): iii.

The respiration of lemon fruits was greatly stimulated by low concentrations of the reaction products of ozone and 1-hexene gas supplied for as little as 1 hour. Green fruits responded more than riper fruit. Longer treatments increased stimulation. Respiration was increased to a smaller extent by ozone alone, but hexene alone had no effect. Preliminary results with bean plants showed a similar, but much smaller stimulation of respiration after exposure to these oxidants.—Univ. Calif., Riverside.

1009. Weathers, L. G., and others.
A bud-union and rootstock disorder of Troyer citrange with Eureka lemon tops.
Plant Dis. Reptr, 1955, **39**: 665-9, bibl. 7, illus., and *Citrus Leaves*, 1955, **35** (9): 8-9, 32, bibl. 7, illus.
Troyer citrange with Eureka tops.
Calif. Citrogr., 1955, **40**: 427-30, bibl. 7, illus.
Lemon on Troyer citrange root.
Calif. Agric., 1955, **9**(11): 11-12, illus.

Eureka lemon trees propagated on Troyer citrange rootstocks show a severe bud-union disorder after 3 years or more of good growth. Starch depletion of the rootstock is accompanied or followed by poor growth and general chlorosis of the lemon top. Extensive bark and wood necrosis of the citrange rootstock frequently develops and sometimes causes the death of trees. The possibility that the disorder may be caused by a virus is discussed. [Authors' abstract of first paper.]—Univ. Calif. Citrus Exp. Stat., Riverside.

1010. Reichert, I.
New light on xyloporosis and tristeza.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The author gives reasons for supposing that xyloporosis and tristeza may be one and the same disease despite the evidence so far afforded to the contrary. He considers, however, that the position cannot be fully clarified until investigators in different parts of the world (1) work on these diseases according to a predetermined, international, co-operative plan and (2) are afforded opportunities of studying the manifestations of the two diseases in different countries.—Agric. Res. Stat., Rehovot, Israel.

1011. Knorr, L. C.
Mancha juvenil de los citrus. **(Juvenile spot of citrus.)**
Idia, 1954, No. 82, pp. 2-3, illus.

Notes are given on a minor leaf spot disease, similar to bacterial canker but of unknown origin, which has been observed in young grapefruit of 3 varieties in Argentina.

1012. Calavan, E. C., and others.
Control treatments for brown rot of citrus fruits.
Calif. Citrogr., 1955, **41**: 2.
Treatments for the control of brown rot of citrus fruits.
Citrus Leaves, 1955, **35**(11): 8-9.

Brown rot losses of lemons and other citrus fruit can be reduced by a single well-timed copper-bearing spray. The results of 2 trials are given in terms of control of brown rot on Eureka lemon fruits and of copper injury to leaves. In areas where copper injury is generally slight recommended spray formulations are (1) bordeaux mixture, 3-4½-100, (2) zinc-copper-lime, 3-2-6-100, or (3) other brands of copper fungicide used at 0·6 to 0·8 lb. metallic copper per 100 gals. In areas where copper is more apt to cause injuries suggested alternatives are (1) zinc-copper-lime, 3-2-6-100 or (2) captan 2 lb./100 gals, 2 applications 10 weeks apart.—Calif. Citrus Exp. Stat., Riverside.

1013. Chowdhury, S.
Citrus sooty moulds in Assam.
Sci. and Cult., 1955, **21**: 164-5, illus.

Surveys revealed that sooty moulds are present in all citrus orchards in Assam, but that shaded plants are more affected than those exposed to full sun. The following fungi were identified in the sooty moulds: *Capnodium citri*, *Meliola butleri*, *Cladosporium herbarium*, and *Acrothecium lanatum*, the first-named species being predominant. Six sprays were tested for control of scale insects, aphids and white flies, which secrete a honey-dew on which these fungi grow. Bordeaux with resin, bordeaux with resin and nicotine sulphate, HETP, lime sulphur, crude oil emulsion and flowers of sulphur, applied at monthly intervals from September to April, all greatly reduced the incidence of sooty mould. Spraying with bordeaux-resin-nicotine sulphate during flowering was, however, harmful.—Plant Path. Lab., Jorhat, Assam.

1014. Reitz, H. J., Sites, J. W., and Long, W. T.
A statistical study of the interrelations among fruit size, aphid damage to leaves, and yield of Hamlin and Temple oranges.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 93-8, bibl. 3.

A statistical study was made in two citrus orchards of the interrelations between degree of leaf damage by aphids, fruit yield, and fruit size. Smaller fruit was found to be associated with severe damage and large crops. Aphid damage also had a limiting effect on the yield of fruit. The effects were of economic importance. [From authors' summary.]—Citrus Exp. Stat., Lake Alfred, Fla.

1015. Fukuda, J., Okudai, S., and Yoshida, I.
Studies on the effectiveness of parathion upon the important injurious insects of various fruit trees. [Japanese with English summary 1¼ p.]
Spec. Rep. hort. Div. Tôkai-Kinki agric. Exp. Stat. **1**, 1953, pp. 1-76, bibl. 37, illus. [received 1955].

Citrus pests: Parathion proved to be lethal to the larvae and ovipositing adults of yanone [arrowhead] scale (*Unaspis yanonensis*) and camphor scale (*Pseudaonidia duplex*). Application is recommended during late May or early June for arrowhead control and in June and September for camphor scale control. Parathion was ineffective against the adults and second and third instar larvae of wax scale (*Ceroplastes rubens*) but gave good control of first instar larvae. It controlled adults and larvae of *Pulvinaria aurantii*, and application from September to May is recommended. *Oriental fruit moth:* in general, parathion proved a more effective ovicide and larvicide against *Grapholitha molesta* than the other insecticides tested. It is recommended that spraying should be done at weekly intervals from Mid-May to a week before harvest in peach orchards and from late July to a week before harvest in pear orchards. Spray residues are not considered dangerous. *Chestnut gall wasp:* Parathion sprays applied in mid-April were effective against the larvae of *Dryocosmus kuriphilus*; the material penetrated the galls.

1016. (Riehl, L. A., and Wedding, R. T.)
Late season oil sprays recommended for scale and mite control.
Citrus Leaves, 1955, **35**(10): 10-11.

The danger of phytotoxicity from petroleum sprays applied in late summer and early fall for scale and mite control can be reduced by good management practices. Complete coverage is necessary for effective pest control, but the concentration of oil in the spray should not be higher than 1·75%. Leaf and fruit drop may be largely prevented by adding 2,4-D to the spray mixture. Oil sprays applied in August and September have the least injurious effect on fruit set, and did not reduce Valencia yields in terms of packed boxes. The effect of oil sprays on juice quality varied with variety and district, but in general August or September sprays gave the best results. Proper application of spray oils should give satisfactory pest control without interfering with photosynthesis.—Calif. Citrus Exp. Stat., Riverside.

1017. Le Pelley, R.
The citrus bud mite, *Aceria sheldoni* (Ewing), Eriophyidae, in Kenya.
E. Afr. agric. J., 1955, **21**: 22-4, bibl. 2, illus.

Chlorobenzilate at 0·1% shows promise for the control of *Aceria sheldoni* which has recently been recognized in Kenya and is now known to be widespread in the territory.

1018. Fukuda, J., and Yoneyama, K.
On new acaricides. [Japanese, with English summary ½ p.]
Spec. Rep. hort. Div. Tôkai-Kinki agric. Exp. Stat. **1**, 1953, pp. 77-97, bibl. 24.

The following acaricides were tested in field experiments against *Metatetranychus citri* on citrus and pears: EPN-300 (27% wettable), TEPP (35·6%), parathion (15% wettable), folidol (46·6%), folidol (1·5% dust); aramite (15% wettable), 2,4-dinitro-6-cyclohexyl phenol (DN emulsion, 15 and 20%), dytrol, derris emulsion (2%) and lime sulphur (34%). All the materials were effective larvicides in summer or winter sprays, but DN emulsion and TEPP were most rapid in action. Ovicidal action was shown by dytrol, DN emulsion, EPN, parathion, folidol and aramite, in that order of effectiveness. Residual action was greatest with DN emulsion, parathion, aramite and EPN and smallest with TEPP and lime sulphur. On the basis of these results DN emulsion or its dust is recommended as the best acaricide.

1019. Leiderman, L.
Experiências de combate ao ácaro causador da ferrugem dos citrus, *Phyllocoptruta oleivora* (Ashm.). **(Experiments on the control of the citrus rust mite, *Phyllocoptruta oleivora*.)**
Biológico, 1955, **21**: 133-9, bibl. 7, illus.

In 1954/55 seven organic acaricides were tested against sulphur sprays for the control of *Phyllocoptruta oleivora* on Baianinha de Piracicaba oranges. Sulphur gave slightly but not statistically significantly better control than the 3 best acaricides, namely, Shell Triona oil, Dimie and Chlorocide. In timing-of-application trials with sulphur dust and with lime sulphur a treatment consisting of 2 applications made at the end of November and the beginning of February was not significantly inferior to one of 4 applications between August and February. Sulphur and 2 of the acaricides resulted in an increase in the populations of *Chysomphalus aonidum* and *Lepidosaphes beckii*.—Inst. biol., São Paulo.

1020. Di Martino, E.
La ruggine gialla dei limoni. **(Yellow rust of lemons.)**
Riv. Agrumic., 1955, **1**(1): 23-7, illus.

Injury to lemon by *Tetranychus telarius* can cause severe defoliation and loss of yield. The symptoms on the leaves and fruit are described. The varieties Interdonato and Monachello are particularly susceptible. In control experiments in 1953/54 white oils, parathion, malathion, Ovotran, Aramite and chlorobenzylate were tested alone and in various mixtures in winter/spring and in summer. The results and conclusions were: (1) Summer treatment was the better, especially with acaricide-ovicide mixtures. (2) Most of the products destroyed the mobile forms of the mite. (3) Ovotran was the only product that destroyed the eggs, but it did not destroy the adults. (4) Best results were given by 200 c.c. Ovimitex, an emulsifiable product containing 25% each of Aramite and Ovotran, plus 50 c.c. wetter per 100 l. water. (5) The Ovimitex preparation had no adverse effect on the predators of the mite. (6) Treatment should be repeated after 10 days.

1021. Hely, P. C.
Red scale and yellow scale: two important pests of citrus trees.
Agric. Gaz. N.S.W., 1955, **66**: 376-9, illus.

Red scale (*Aonidiella aurantii*) is the most important citrus pest in N.S.W.; yellow scale (*A. citrina*) is found in coastal areas and Lower Murray groves. Their life history and dispersal are described. Direct control of both species may be obtained by fumigation with HCN or by spraying with white oils from December to March. Good results have been obtained by using white oils (1: 80) applied several times during the period of maximum scale development. Two applications of white oil at 1:180, applied at a few days apart, also gave effective control. Satisfactory control has been obtained in experiments with single sprays of parathion or malathion at high concentrations. The best results were obtained where a December oil spray was followed by parathion or malathion.

1022. Fukuda, J., and Koremura, M.
Studies on the resistance of citrus varieties to the arrowhead scale, *Unaspis yanonensis* Kuwana. II. On the contents of nutrients and organic acids in the leaves of Satsuma orange, *Citrus natsudaidai* and *Citrus junos*. [Japanese, with English summary 1 p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 150-9, bibl. 3.

Chromatographical analyses of leaves were made with a view to determining the factors responsible for the relative resistance of *Citrus natsudaidai* and *C. junos* to arrow head scale (*Unaspis yanonensis*) as compared with Satsuma orange [see *H.A.*, 23: 3468]. It is concluded that in Natsudaidai resistance may be due to the relatively low total nitrogen, amino nitrogen and polypeptide nitrogen contents and high organic acid content of the leaves, whereas in Junos resistance may be due to some material lethal to the scale larvae. Among 37 [other?] citrus species tested, only *Citrus hanajuzu* was found to be resistant to arrowhead scale.

1023. Lewis, H. C., Worthy, W. L., and LaFollette, J. R.
Mechanical booms for citrus spraying.
Calif. Citrogr., 1955, **40**: 440, 452-4, illus.

The advantages and disadvantages of boom spraying for citrus are discussed. Types of boom in use in California are described.

Citrus—pre-harvest treatments and harvesting.

(*See also* 1068r.)

1024. Anon.
Premature fruit fall in oranges.
Suppl. A.R. Zanzibar Dep. Agric. 1954, 1955, pp. 6-7.

Spraying orange trees with 70 p.p.m. of 80% 2,4-D when the fruit was mature gave good control of premature drop for about 3 months.

1025. Koto, M., and Yagi, T.
Experiment on bagging early Satsuma oranges (*Citrus unshiu* Markovitch).
[Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 40-4, bibl. 12.

The effects of several kinds of coloured bags on fruit colour and juice composition were studied, bagging taking place on the 20th August and harvesting 2 months later. Yellow and red cellophane bags resulted in increases in fruit colour, total sugars content and the total sugars/acid ratio. White paraffin paper bags increased fruit colour but not the total sugar/acid ratio. Blue cellophane bags resulted in little change in fruit colour. Newspaper bags caused a delay in fruit colouring and a decrease in total sugars, but colouring could be accelerated by removing the bags 20 days before picking. [See also *H.A.*, 25: 924.]

1026. Eaks, I. L.
Bulk handling effect on fruit quality.
Calif. Citrogr., 1955, **41**: 43-4, bibl. 2.
Effect of bulk handling, operations upon quality of fresh citrus fruit.
Citrus Leaves, 1955, **35**(11): 6-7, bibl. 2.

Tests were conducted on bulk handling of oranges and lemons from field to packing house. Each operation increased the number of mechanical injuries on the fruit but did not materially affect its physiology as measured by weight loss and respiration. Fruit could be handled in boxes up to 48 inches deep without detectable injury. There was little difference commercially between fruit handled in bulk containers and in field boxes.—Calif. Citrus Exp. Stat., Riverside.

1027. Cassidy, P. H.
Novel bulk handling operation devised by Ventura Coastal Lemon Company.
Citrus Leaves, 1955, **35**(8): 6-7, 33, illus.

Bulk handling has been used in collecting and transporting lemons to the packing house. All-steel bins with slotted bottoms are used, which can hold the equivalent of 27 field boxes. Nine units can be carried per trip by a lumber carrier with a trailer. The units are emptied in the packing house by sliding them into a tank of water.

Citrus—packing and storage.

(*See also* 1068c, e, f, j, p, u, w, 1232.)

1028. Cassidy, P. H.
Volume filling operation reduces packing costs at orange co-operative.
Citrus Leaves, 1955, **35**(9): 12-13, illus.

Packing costs are claimed to have been reduced by 50% after the introduction of an automatic filling unit for oranges. The fruit is sized on a grading unit and then drops into a carton. When the desired weight for each size is reached the carton is automatically propelled on to a conveyor belt.

1029. Garoche, P.
Transport d'agrumes en charges palettisées.
(The carriage of citrus boxes in reinforced stacks.)
Fruits d'Outre Mer, 1955, **10**: 439-41, illus.

Notes are given on successful experiments on the carriage from Algeria to Paris in reinforced plywood boxes in stacks convenient for fork-lifting. A stack consists of 5 tiers of 7 boxes, is reinforced with wooden grids at top and bottom and with hoops, measures 1·72 m. high × 1·15 m. × 1 m., and, loaded with oranges, weighs 930 kg.

1030. Smith, R. J.
Colouring of oranges in bulk bins.
Calif. Citrogr., 1955, **40**: 472-4, bibl. 2, illus.

A spectrophotometer was used to measure colour development in oranges treated with ethylene gas in bulk bins and in standard field boxes. The trial revealed no disadvantage in using bulk bins for applying ethylene gas, but further tests will be necessary before final conclusions can be drawn.—Univ. Calif., Los Angeles.

1031. Grierson, W., and Newhall, W. F.
Tolerance to ethylene of various types of citrus fruit.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 244-50, bibl. 13.

Total storage losses in various varieties of citrus fruits have been found to be related to both the concentration of ethylene used in degreening and the duration of exposure to a given concentration of ethylene. The increase in decay due to the use of ethylene was attributable to the resultant increases in stem-end rot, with epidermal injury as a secondary factor for Temple oranges and tangerines. Presumably no such relationship between the use of ethylene and subsequent decay could be expected in districts in which stem-end rot is not a factor. The above findings would indicate that total losses in degreened citrus fruits could be reduced appreciably by using the minimum concentration of ethylene to effect degreening and by removing degreened fruits from the ethylene atmosphere as soon as possible. [From authors' conclusions.]—Fla Citrus Exp. Stat., Lake Alfred.

1032. FUJITA, K., MUKASA, S., AND KOTO, M.
Effect of temperature and humidity on the storage life of Satsuma oranges. Experiments on different storage methods. III. [Japanese, with English summary 10 lines.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 1-8, bibl. 8.

The effects of pre-cooling [at 5° C.?] on loss of weight, rotting and juice composition were studied. The best results were obtained when fruit was pre-cooled for a relatively short period at 80-85% R.H. until its weight had decreased by 3%. Fruit pre-cooled for longer periods at higher humidities showed inferior keeping quality in subsequent long-term storage.

1033. GRIERSON, W., AND NEWHALL, W. F.
"Sloughing" . . . a new disease of red grapefruit.
Citrus Ind., 1955, **36**(10): 16, 19.

In 3 consecutive seasons a peel breakdown of red grapefruit has been observed in the packing house. The disease can occur unexpectedly, the first symptoms being the development of dark blotches on the surface of the fruit. These are confined to the peel and albedo; they become soft and moist, and tend to slip off the sound flesh when the fruit is handled. The symptoms have been reported from several packing houses and are generally widespread throughout the affected picking. The disease does not appear to be caused by degreening, but is hastened and accentuated by this process. Cultured diseased tissues produced only common grove organisms. The occurrences so far reported have started during periods of high temperature following prolonged heavy rain in the autumn. The best control at present is to stop picking until the danger is past.—Fla Citrus Exp. Stat., Lake Alfred.

1034. TANAKA, S., AND OTHERS.
Studies on the control of citrus fruit decay in storage. I. Survey of fruit decay of Satsuma orange in storage (I) [Japanese, with English summary 1 p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 69-88, bibl. 45.

A survey was made during 1947-53 of the fungi causing decay of Satsuma oranges in storage. Kinds of decay and their prevalence varied from year to year, but common green mould (*Penicillium digitatum*) and stem-end rot (*Phomopsis citri*) were the most prevalent, followed by blue-mould (*Penicillium italicum*) and Alternaria rot (*Alternaria citri*), while *Botrytis cinerea*, *Fusarium sp.*, *Phoma citricarpa*, *Phellomyces citri*, *Colletotrichum gloeosporioides* and *Sclerotinia libertiana* occurred rarely. Some close relationships were found between fruit decay in storage and meteorological conditions before harvest; for example, frost injury resulted in a serious outbreak of *Phoma* rot. There was also a close relationship between the occurrence of stem-end rot in storage and melanose injection at harvest time. In years when the incidence of fruit decay was high, green mould was generally much more prevalent than blue mould, but in years of lower infection both diseases occurred to much the same extent or blue mould was the more prevalent. No close relationship was found between the incidence of decay and temperature during storage, although there was a tendency for decay to increase with a rise in temperature.

1035. TANAKA, S., AND OTHERS.
Studies on the control of citrus fruit decay in storage. II. Experiments on the chemical control of citrus fruit decay 1948-1952. [Japanese, with English summary 1 p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 89-112, bibl. 72.

In experiments carried out during 1948-52 on the control of Storage rots of Satsuma oranges 15 chemicals were tested, the fruits being treated before storage by spraying, dusting, dipping or wrapping. Boric acid reduced decay caused by *Penicillium* spp. but increased other types; spraying with concentrations of 5% or more injured the fruit rind and caused oleocellosis. Sulphur fungicides and organic fungicides such as diphenyl, spergon, phygon, dithane and zerlate had little beneficial effect and in some cases increased decay; spergon especially increased stem-end rot (*Phomopsis citri*). Spraying with the mercurials riogen and mercron gave very effective control, especially during the latter part of the storage period, but dusting with ceresan caused severe injury. Spraying with 0·5% thiourea also caused marked injury and did not retard decay. The best control of fruit decay, especially stem-end rot and black rot (*Alternaria citri*), was obtained by spraying with a 2% suspension of citrol, although this caused little reduction of blue or green moulds; the treated fruits, however, showed slight oleocellosis and marked blackening of the calyx from the beginning of March. All dipping treatments were unsatisfactory, and dipping in a 2% suspension of citrol increased the occurrence of every disease except stem-end rot.

1036. LEMONNIER, M. A.
Les traitements chimiques des agrumes. **(Chemical treatment of citrus.)**
Fruits d'Outre Mer, 1955, **10**: 418-26, bibl. 16, illus.

Further experiments by I.F.A.C. on reducing losses caused by *Penicillium* and desiccation show that the most effective fungicidal treatments are dips for 3-5 minutes at 18° C. in either a 5% solution of Pentabor plus a wetter at 1-2‰, or a 3% solution of Product 119, a mixture of phenols and formaldehyde. Against desiccation the fruits, after drying, should be coated with a thin skin of wax either by dipping or spraying. [See also *H.A.*, 22: 2975, 23: 2199, 24: 1886 and 25: 958.]

1037. SLADE, M. A., JR.
The control of citrus spoilage with "Sta-Fresh" 4 DK.
Citrus Mag., 1955, **18**(2): 18-19, illus.

Spoilage in oranges after 3 weeks' storage was reduced from 39·4% in untreated controls to 8·9% by the brush application of a compound [composition not stated] named "Sta-Fresh" 4 DK, which was developed by Food Machinery and Chemical Corporation, Lakeland, Florida.

1038. ROISTACHER, C. N., AND KLOTZ, L. J.
A device for rapid inoculation of citrus fruits.
Phytopathology, 1955, **45**: 517-18, illus.

The device was designed to aid investigations on the control of decay caused by *Penicillium italicum* and *P. digitatum*. It consists of a Plexiglas container holding a suspension of inoculum in water and also enclosing a circular saw blade which dips into the inoculum and projects 1 mm. through a slit in the top. The saw, which rotates at a speed of 210 r.p.m., carries a film of spore suspension with it while agitating the liquid inoculum, and thus keeping the spores in suspension. Fruit pressed gently on the protruding blade is simultaneously injured and inoculated uniformly.—Calif. Citrus Exp. Stat., Riverside.

Dates.

(*See also* 1005, 1068h, s.)

1039. Munier, P.
Le palmier-dattier en Mauritanie. (**The date palm in Mauritania.**)
Ann. Inst. Fruits Agrumes colon. **12**, 1955, pp. 66, bibl. 43, illus.

The present position and future possibilities of date growing in Mauritania are discussed. Subjects covered include the date-growing districts, the performance of the palm in relation to local climatic conditions, varieties, yields, cultural practices, pest and disease control, improved water supplies and tools, potential production and markets.

1040. Furr, J. R., and Armstrong, W. W.
Growth and yield of Khadrawy date palms irrigated at different intervals for two years.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, pp. 3-7, bibl. 10.

Irrigation was supplied at 2,4,8 and 16-week intervals to 18-year-old Khadrawy date palms on a stratified alluvial soil for 2 seasons. Root sampling studies showed that feeder roots were concentrated in the silty soil of the top 5-6 feet and were scarce below this depth except in silty strata. In the 2,4 and 8-week treatments the water capacity in the high root-feeding zone fluctuated between field capacity and various levels between field capacity and wilting percentage. In the late summer and early autumn in the 16-week treatment the moisture content of most of the soil in the top layer remained about the wilting range for several weeks in both years. So long as the moisture content of the soil remained above the wilting range, neither yields nor leaf-growth rates were significantly reduced by water shortage. When the soil was allowed to remain in the wilting range for several weeks, there were significant reductions in leaf-growth rate and in fresh weight per fruit, and inflorescence emergence in the following spring was delayed; but there was no significant reduction in yield because the shortage occurred when the fruit was mature or ripening.—U.S. Dep. Agric., Indio, Calif.

1041. Nixon, R. W.
Size and checking of Deglet Noor dates as affected by fruit thinning and pollen.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, pp. 8-10, bibl. 13.

Deglet Noor palms, 19 years old, were used in studies on the combined influence of fruit thinning and pollen source on fruit size and time of ripening. Results showed that each factor affected the size of fruit more or less independently of the other. An increase in fruit size due to pollen source was not accompanied by an increase in checking [development of minute cracks in apical ½ of the fruit]. An increase in fruit size produced by thinning was accompanied by an increase in the amount and severity of checking and blacknose [blackening of checked area].—U.S. Date Gdn, Indio, Calif.

1042. Brown, T. R.
New developments in paper bags.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, p. 13.

The annual cost of creped paper cylinders commonly used for date bunch protection is kept high by the labour for removal and the need for storage. A flat waxed sheet was tried in 1953 and was fairly successful, although it was apt to be torn by wind or become unwrapped. A creped flat sheet was stronger and more successful. These sheets were tied by a paper-covered wire. In comparison with the returns of a neighbouring grower, who did not bag, there was an estimated saving of $28·87 per acre due to bagging.

1043. Darley, E. F., and Wilbur, W. D.
Results of experiments on control of fruit spoilage of Deglet Noor and Saidy dates in California, 1935-1954.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, pp. 14-15, bibl. 4.

On an average, serious spoilage occurs only once in 5 years. The average weight loss from fungus spoilage in fruit covered with paper bags only was 8%. The use of wire rings in the bunches increased aeration and reduced water injury. Thiomate "19" (a 5% mixture of ferbam in sulphur) significantly reduced fungus spoilage. The authors recommend as a minimum treatment for spoilage bagging the fruit and dusting with Thiomate; the use of rings is also desirable. Results indicate that even in years of low spoilage it has paid to treat the fruit. [For an earlier report see *H.A.*, 25: 2075.]—Calif. Citrus Exp. Stat., Riverside.

1044. Smith, E. E.
Evaluation of effectiveness of malathion in the five principal date growing districts of the Coachella Valley.
Rep. 32nd annu. Date Grs'. Inst., Coachella, 1955, p. 17.

Results from trials with malathion for the control of date beetle showed that the timing of the first application was very important. To obtain good control dusting should first be done at the first sign of ripening, followed by another application either 3 weeks before picking or immediately after the first pick.—Valley Date Gdns.

1045. Halsey, D. D.
Costs and methods in removing date palms.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, p. 7.

A short account is given of recent experience in grubbing date palms in the Coachella Valley. Bulldozing with windrowing was the commonest method, and costs varied from $2.50 to $9.50 per tree, the haulage distance for burning adding to the cost. Some growers used hand-digging (estimated cost $2-3), followed by pulling over by tractor; such palms have a good ball of roots and can be transplanted for ornamental use.

Another method was to cut off the top, and split and dry the stump which was then burned. The per acre cost of bull-dozing and windrowing is about $300.—Calif. agric. Ext. Serv., Riverside.

Litchis.

(*See also* 1070.)

1046. Stephens, S. E.
The litchi.
Qd agric. J., 1955, **81**: 19-20.

Several soil types in North Queensland are suitable for litchi growing, but few trees are at present grown, probably because vegetative propagation is difficult. Kwai Mee and Wai Chee have proved the best varieties so far introduced to Queensland, and Haak Ip has also given good results.

1047. Cohen, M.
Clitocybe root rot of lychee.
Citrus Ind., 1955, **36**(8): 11-15, bibl. 8, illus.

Crown root rot, caused by *Clitocybe tabescens*, has been observed on litchis in parts of Florida. A list of alternative hosts is given. An infected tree should be removed immediately with as much of the infected root system as possible. Careful root surgery may also help to prolong the life of an isolated infected tree. Areas on which non-susceptible crops have been grown for more than 10 years or newly-cleared areas on which there had been no scrub oak are to be preferred for new litchi plantations.

Olives.

(*See also* 64, 87, 1068l, m, t, 1070, 1263.)

1048.
Ḿársico, D. F.
El aceite de oliva argentino. (**Argentine olive oil.**) [English summary 10 lines.]
Bol. Oleic. int., 1955, **5**(27): 3-18, bibl. 14.

This article includes information on the number and distribution of the olive trees under cultivation in Argentina, oil and table varieties, and the oil yields of some varieties.

1049. Noro, K.
Bibliographical study on the olive tree. V. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 87-97, bibl. 67.

Notes are given on developments taking place in olive growing and processing in Japan and the review of world literature on olives is continued. [For parts I-IV see *H.A.*, 22: 3364, 23: 2216p and 24: 1892.]

1050. Cilli, L. M.
Impiego di fitormoni e sali inorganici nel radicamento di talee d'olivo. (**Use of growth substances and inorganic salts for rooting olive cuttings.**) [English summary 10 lines.]
Ann. Sper. agrar., 1955, **9**: 1107-13, bibl. 19, illus.

In 1954 rooting experiments were made with small, 1- and 2-year-old cuttings of 4 olive varieties, which had previously given negative results. The cuttings were dipped in 0·5‰ Belvitan, a growth substance preparation of unspecified composition, for 24 hours or in a N/400 solution of either manganese sulphate, ferrous sulphate or lead nitrate for half an hour. Only Chiandaro and Cucco produced roots and these were thin and unbranched. One-year-old cuttings were better than 2-year-old cuttings. With 1-year-old cuttings of Ghiandaro rooting percentages were 40, 25 and 20 respectively with Belvitan, ferrous sulphate and manganese sulphate compared with 8% in the control. Corresponding figures for Cucco were 46, nil, 10 and nil. Lead nitrate gave no rooting.—Staz. sper. Olivic. Oleific., Pescara.

1051. de la Rocha G., G.
Estudio di diversos sistemas de propagación asexual o artificial. (**Study on various method of vegetative propagation [of the olive].**)
Inform. mens. Estac. exp. agric. La Molina, December 1954, pp. 12-17, illus.

In experiments on 3 olive varieties the percentages of rooted plants obtained with the different treatments were (1) cuttings buried horizontally—160 (40 out of the 50 cuttings struck and yielded 80 plants); (2) cuttings planted obliquely—80; (3) cuttings with heels planted vertically—60; (4) cuttings without heels planted vertically—46; (5) budded cuttings planted horizontally—complete failure. The horizontally planted cuttings in (1) were taken from 3-year-old branches 5-8 cm. in diameter and 50 cm. long and were covered with 10 cm. soil. They yielded vigorous, well-developed plants with good root systems.

1052. Spiegel, P.
Water requirement of the olive tree, critical periods of moisture stress and the effect of irrigation upon the oil content of its fruit.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

Under conditions in the coastal area of Israel, with an average rainfall of 450-650 mm., the olive's water needs between March and December are found to be 600-850 cu. m. per dunam (approx. 1,000 sq. m.). Irrigation during the early stage of development has no material effect on ultimate fruit size but irrigation after the pit has hardened greatly increases fruit volume, while delaying maturity and colouring. Early summer irrigation increases shoot growth, and the omission of irrigation in late summer and autumn delays flowering the following spring and lowers the percentage of perfect flowers and the numbers of flowers and of fruits set. Though oil percentage in the dry matter is not lowered by irrigation, a higher water content accounts for the lower oil percentage in the fresh weight of fruits from irrigated trees. Taking the better fruit size and improved flesh/pit ratio into account the fruits from irrigated trees produce a higher total oil yield.—Minist. Agric., Jerusalem, Israel.

1053. Marinucci, M.
La sconcatura e rincalzatura dell'olivo. (**The removal of soil from and earthing up of the olive.**)
Ital. agric., 1955, **92**: 399-403, illus.

In the practice of soil removal, earth is removed to a depth of 10-15 cm. all round the tree and built up into an embankment under its skirt before the rainy season with a view to moisture conservation. Earthing-up is carried out either in summer to give protection from the sun or, in winter in the north, to give protection from frost. [See also *H.A.*, 25: 2087.]

1054. Katakura, K., and Narasaki, T.
Fundamental studies on the utilization of olive fruits. I. Changes in composition during maturation.
Narasaki, T., and Katakura, K.
Idem. II. Identification of the amino acids in the protein hydrolyzate of ripe olive pulp by chromatography. [In English.]
Tech. Bull. Kagawa agric. Coll., 1954, **6**: 1-7, bibl. 7, and 194-8, bibl. 14.

I. Variations in fresh weight and in the content of crude oil, total sugars, moisture, crude protein and ash were studied in 3 varieties during the later stages of maturation during mid-September to mid-December. The results were: (1) All varieties showed the cyclic growth behaviour typical of drupaceous fruits as observed by Hartmann [see *H.A.*, 20: 1334]. (2) This growth behaviour was reflected in variations in the contents of moisture, crude oil and total sugars but not of crude protein or ash. (3) There appeared to be some correlation between oil accumulation and carbohydrate metabolism. (4) The oil content was highest about the end of November. (5) The fresh weight rose sharply to a peak at the end of November and then fell sharply. II. The amino acids found were aspartic acid, glutamic acid, serine, glycine, lysine, alanine, proline, tyrosine, valine, phenylalanine, leucine, isoleucine and histidine. Methionine and threonine were not present.

1055. Avidor, Z., Mohrer, I., and Harpaz, I.
Control of olive fly with dieldrin and methoxychlor in Israel.
FAO Plant Prot. Bull., 1955, **3**: 145-7.

In an olive grove of the variety Merkhaviah, the first spray treatment was given in mid-June and was followed by a second in mid-July. Sprays with 0·5% active ingredient of methoxychlor and especially of dieldrin gave effective control of *Dacus oleae*. Concentrations of 0·2% active ingredient of dieldrin seemed to give as good results as 0·5%. [See also *H.A.*, 25: 4334.]—Agric. Res. Stat. and Hebrew Univ., Rehovot.

1056. Laguía, P.
Influencia de la pectinasa en la extracción de aceite de oliva. (**Influence of pectinase in the extraction of olive oil.**) [English summary.]
An. Bromatol., 1954, **6**: 309-16, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2266.

By leaving olive pulp in contact with pectinase for 12 hours before pressing, the quantity of oil obtained is increased by about 3%, compared with the ordinary commercial method. Pectinase treatment also has a favourable effect on the acidity of the oil and facilitates its extraction.

Passion fruit.

(*See also* 1068k.)

1057. Macmahon, J. W.
Notes on passionfruit growing.
Tasm. J. Agric., 1955, **26**: 255-7, illus.

There are as yet no commercial plantations of passion fruit in Tasmania, but it will grow in sheltered positions. Selected vines have been grafted to hardy rootstocks such as "banana" passion fruit and *Passiflora caerulea*. Pruning is probably best done towards the end of the winter. The "bullet" virus is the main disease in Tasmania.

1058. Murakishi, H. H., and Aragaki, M.
Passion fruit disease control.
Hawaii Fm Sci., 1955, **4**(2): 4, illus.

In 1954/55 2% captan, maneb and ziram were tested against brown spot (*Alternaria passiflorae*), fortnightly applications beginning in mid-November. Maneb gave the best results, namely, 12% leaf infection and 0·8 spots per fruit compared with 66% and 3·5 in the control.

1059. Pruthi, J. S., and Lal, G.
Studies on the nutritive value and utilization of purple passion fruits (*Passiflora edulis* Sims.).
Indian J. Hort., 1955, **12**: 34-7, bibl. 4, illus.

Results are given of investigations carried out during 6 seasons on the nutritive value, processing and utilization of purple passion fruits. Considerable variation was noticed in the physico-chemical content of the fruit. Analysis of the juice (35% of the whole fruit) showed it to be a fairly rich source of carotene (0·8 mg./100 g.) and ascorbic acid (35 mg./100 g.). The peel, which is normally wasted, contained 10-12% pectin, and conserves have been prepared from it. The seeds (10-20% of the whole fruit) contain 20-25% of a semi-drying oil, which has been refined and hydrogenated.—Centr. Food Tech. Res. Inst., Mysore.

Persimmons.

(*See also* 190, 1068n.)

1060. Kurokami, T., and others.
Physiological and ecological studies on fruit trees in sloping orchards. Relation between the environmental factors of sloping orchards and the growth of fruit trees. I. (1) and (2), and II. [Japanese, with English summary of Part II 1 p.]
Tech. Bull. Kagawa agric. Coll., 1954, **5**: 79-93, illus., **5**: 144-58, illus., and 1954, **6**: 105-20, bibl. 57, illus.

The studies described in Part II were made in persimmon orchards of the college farm at Ōmiga, Hirai-cho, near Takamatsu in southern Japan in 1951. The experimental blocks contained irrigation, mulch, sod-culture and control plots, and were situated at the top and bottom of a 15% slope facing south-west. In a year characterized by drought and high temperatures in August shoot and fruit development were greatest in the mulch plot, followed by the irrigation plot, the top control plot, the bottom control plot and the sod-culture plot.

1061. Iikubo, S., and others.
Studies on the inheritance of vitamin C content of persimmon fruits. [Japanese, with English summary ⅔ p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 42-56, bibl. 18.

Analysis of persimmon fruits showed that the vitamin C content of the skin was 4-6 times as high as that of the flesh, and that that of the blossom end of the fruit was generally much higher than that of the core. Large fruits contained more vitamin C than smaller ones. Vitamin C content decreased as the fruit ripened and also during storage, although the level was maintained fairly satisfactorily in cold storage. Infection by *Gloeosporium kaki* affected the ratio of ascorbic to dehydro-ascorbic acid. Defoliation one month before harvest time had no effect on the vitamin C content of the fruit. The level of the vitamin content appeared to be an inherited factor.

1062. Fujita, K., and others.
Experiments on the practical use of a mist-sprayer for citrus and persimmons. [Japanese with English summaries 9 and 11 lines.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1955, No. 3, pp. 9-14, bibl. 6, illus. and pp. 14-18.

Mist-blowing and conventional power and hand spraying were compared for disease and pest control on citrus and for the control of the fruit moth (*Kakivoria flavofasciata*) on persimmon are discussed. In the latter case the material used was bordeaux mixture with added zinc sulphate and lead arsenate. In general the mist-blower produced slightly inferior control but effected marked savings in costs.

1063. Fukuda, J., Iikubo, S., and Okudai, S.
On the characteristic scurfing of persimmon fruit. [Japanese, with English summary 1 p.]
Bull. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1954, No. 2, pp. 172-87, illus.

A series of experiments was carried out in 1951 and 1952 to determine the cause of a characteristic scurf occurring on the skin of persimmon fruits. The results indicated that the scurf was due to thrips damage. Among the 5 species of thrips collected from persimmon flowers *Scirtothrips dorsalis* was the commonest. Incidence of scurf could be reduced by applying insecticides such as BHC or DDT to control the thrips during the period of emergence, namely from a few days before flowering till petal fall.

Tung.

(*See also* 1068q, 1263.)

1064. Laycock, D. H., and Foster, L. J.
Rainfall and biennial bearing in tung *(Aleurites montana)*.
Nature, 1955, **176**: 654.

Records of tung yields from a field at the Tung Experimental Station, Limbe, Nyasaland, were studied in relation to rainfall data for various growth periods in the years 1947-54. A positive correlation was found to exist between total rainfall for the months June-August and the yield in the following year. This June-August period is the time at which flower primordials are being formed and occurs 9-12 months before the resulting crop is harvested. The biennial bearing during the years under study can be explained on the basis of this correlation. No significant correlation coefficient was obtained between yield and rainfall during other stages of growth.

1065. Drosdoff, M., and others.
Inter-relations of source of nitrogen with levels of nitrogen, calcium and magnesium in tung nutrition.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 32-40, bibl. 9.

In an experiment on fine sand, very low in exchangeable Ca and Mg, 8-year-old Mg-deficient tung trees were treated with factorial combinations of 2 levels each of N, K, Ca and Mg and 3 sources of N (sodium nitrate, ammonium nitrate and urea). Applications were made annually over a 5-year period. The first substantial crop was harvested at the end of the fifth year. Yield data supplemented with leaf analyses showed that: (1) Sodium nitrate was ineffective in increasing fruit production at low levels of Ca and Mg, although the other sources of N resulted in considerable yield increases. The ineffectiveness of sodium nitrate is considered to be due to an increase in oxalic acid in the leaves when the nitrate/ammonium ratio is high, with a consequent precipitation of Ca [see *H.A.*, 22: 1842]. (2) High levels of Ca and/or Mg greatly increased yields at the high N levels. (3) At high N levels, high Ca applications with low Mg increased yields to about the same extent as high Mg with low Ca. High levels of both Ca and Mg were no more effective than high levels of either element alone. (4) It is postulated that for certain plant functions, such as oxalate precipitation, Ca and Mg may play similar roles and may be partially substituted for one another.—U.S. Dep. Agric., Gainesville Fla.

1066. Merrill, S., Jr., Potter, G. F., and Brown, R. T.
Effects of nitrogen, phosphorus, and potassium on mature tung trees growing on Red Bay fine sandy loam.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 41-8, bibl. 7.

A final report is given on a 13-years' nutritional experiment with tung grown on a fine sandy loam in Mississippi. [For preliminary reports see *H.A.*, 18: 2157 and 19: 3380]. Application of N, P or K significantly increased the leaf content of that element. High levels of N relative to K caused severe K deficiency, resulting in the loss of a considerable number of trees from cold injury. The main effects of increasing the level of N were to increase trunk cross-sectional area, to increase yield of air-dry whole fruit, to lower the percentage of oil in whole fruit and to decrease resistance to low temperature in autumn. The main effects of increasing the level of K were to increase the percentage of oil in the air-dry, whole fruit and to increase resistance to low temperature. By improving the stand during the later years of the experiment K increased the yield per acre of fruit and oil. On the basis of these results the recommended annual applications of N, P_2O_5 and K_2O for mature tung trees on this soil are, respectively, 1·5, 0·6 and 1·5 lb. per tree.—U.S. Dep. Agric., Bogalusa, La., and Spring Hill, Alabama.

1067. Goguadze, V. P.
Tung oil. [Russian.]
Priroda, 1955, **44**(7):89-92, illus.

In the U.S.S.R. 2 species of tung, *Aleurites fordii* and *A. cordata*, are grown. This article describes the chemical composition, properties and characteristics of the oil and enumerates the uses of both the oil and its by-products.

Noted.

1068.

a Abramsky, M., and Biale, J. B.
The pyruvate oxidation system in avocado fruit particles.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxviii-xxix.

b Anon.
Citrus diseases can cripple orchards. Methods of control and formulae for sprays.
Fmrs' Wkly S. Afr., reprinted in *Citrus Gr*, 1955, No. 230, pp. 7-9.
Including a spray programme for South Africa.

c Anon.
Le conditionnement des agrumes au Maroc. (**Preparing citrus for export in Morocco.)**
Fruits d'Outre Mer, 1955, **10**: 405-9, illus.
Packing-house practices.

d Anon.
The Mexican fruit fly: how we fight it.
[*Publ.*] *U.S. Dep. Agric.* **PA 265**, 1955, pp. 7, illus.
Anastrepha ludens: quarantine and eradication methods and fruit sterilization.

e Bellamy, M.
Conditionnement des agrumes en emballage de vente. (**Pre-packaging citrus for retail sale.**)
Fruits d'Outre Mer, 1955, **10**: 449-50, illus.
The advantages of pre-packaging and packing-house technique.

f Cantrill, K.
Marketing citrus fruit—packing oranges.
Agric. Gaz. N.S.W., 1955, **66**: 363-4.
Grading regulations with diagrams.

g Carman, G. E.
Spray coverage.
Calif. Citrogr., 1955, **40**: 440, 462-7, illus.
Discussed in some detail with special reference to citrus.

h Dowson, V. H. W.
Dates in Somaliland and Libya.
Rep. 32nd annu. Date Grs' Inst., Coachella, 1955, pp. 10-13.

i Fletcher, W. A.
Pruning citrus trees.
N.Z. J. Agric., 1955, **91**: 161-71, bibl. 4, illus.
General recommendations.

j Fonsart, P.
Les transports en containers. Extension de cette technique au trafic des fruits et primeurs. (**Extension of the use of bulk-containers for the transport of fruit and vegetables.**)
Fruits d'Outre Mer, 1955, **10**: 442-5, illus.
Dimensions, method of packing and advantages in North Africa.

k Johnston, J. J.
Passion fruit growing in Western Australia.
Planter, 1955, **31**: 461-3.
Notes on climate, site, types, culture, diseases and irrigation.

l Krochmal, A.
Olive-growing in Greece.
Econ. Bot., 1955, **9**: 228-32, bibl. 2, illus.
Including short notes on varieties.

m Liera Gutierrez, G.
L'adattamento dell'olivo nel Messico. (**Adaptation of the olive in Mexico.**)
Riv. Agric. subtrop., 1955, **49**: 239-51, illus.

n Matsui, S., Ito, S., and Murata, N.
Studies on processing of persimmon (*Diospyros kaki* L.). [Japanese, with English summary 3 pp.]
Studies on the Preservation of the Fruit of Japanese Chestnut and Japanese Persimmon, 1953, No. 7, pp. 69-101, bibl. 12, illus., reprinted as *Mem. hort. Div. nat. Tôkai-Kinki agric. Exp. Stat.* **15.**
Including data on varieties for sun-drying and for canning.

o Panaretos, A.
Carob growing in Cyprus.
Countryman, Nicosia, September, 1955, pp. 7-8, illus.
Production, culture, varieties, diseases, rats and other pests.

p Patron, A.
L'utilisation des déchets de l'industrie des jus de fruits au Maroc. (**Utilization of the waste products of the fruit juice industry in Morocco.**)
Fruits et Prim., 1955, **25**: 297-305, bibl. 68.
Possible uses for citrus waste products.

q Roghani, M. S., and Ahmad, S. M.-D.
Tung tree cultivation in the North-West Frontier Province seems to have a bright future.
Agric. Pakistan, 1954, **5**: 103-5.
Oil yields of locally grown tung fruits are given.

r Russo, F.
La raccolta e la lavorazione dei limoni per consumo diretto in California. Alcune considerazioni che interessano i coltivatori e gli esportatori italiana. (**The harvesting and preparation for sale of fresh lemons in California. Some points of interest to Italian growers and exporters.**)
Riv. Agrumic., 1955, **1**(1): 11-22, illus.

s RYGG, G. L.
Relation of dry texture in Deglet Noor dates to high spring temperatures.
Proc. Amer. Soc. hort. Sci., 1955, **65**: 199-202, bibl. 3.
[See *H.A.*, 25: 2069.]

t SCARAMUZZI, F., AND CANCELLIERI, M. B.
Contributo allo studio delle razze d'olivo coltivate in Toscana. Indagini condotte in provincia di Livorno e nella media valle del Cecina. III. **(Contribution to the study of the olive varieties grown in Tuscany. Investigations made in the province of Leghorn and the middle Cecina valley. III.)** [English summary 6 lines.]
Ann. Sper. agrar., 1955, Vol. 9, No. 5, Suppl. pp. I-XXVII, illus.
Fourteen varieties. For parts I and II see *H.A.*, 25: 4329.

u SMITH, R. J., FULTON, R. E., JR., AND PERRY, R. L.
Volume fill for large oranges.
Citrus Leaves, 1955, **35**(4): 10-11, 18, 26, 28, illus.
Recommendations are for the use of an Overstrom shaker to aid filling.

v STOJANOV, N., AND AHTAROV, B.
On the problem of subtropical crops in south-western Bulgaria. [Bulgarian, with Russian and German summaries 1½ pp. each.]
Izv. bot. Inst. Sofia, 1955, **4**: 19-51, bibl. 20.
Possibilities in a relatively unfavourable climate, discussed.

w WOOG, R. G.
Le conditionnement et l'emballage des agrumes en Algérie. **(Preparing and packing citrus for export in Algeria.)**
Fruits d'Outre Mer, 1955, **10**: 410-12.
Packing-house practices.

TROPICAL FRUIT AND PLANTATION CROPS

General.

(*See also* 1235c, t, 1257, 1265, 1268, 1271, 1272, 1277-1279, 1284, 1285i, j, o, p, r, s, v.)

1069. INTERNATIONAL LABOUR ORGANIZATION.
Committee on work on plantations. Third session, Geneva, 1955.
Report I. Item 1 (a) and (b). General report: Effect given to the conclusions of the previous sessions.
Report I. Item 1 (c). General report.
Report II. Living and working conditions and productivity on plantations.
Report III. Possible measures within the countries and industries concerned for stabilizing employment and earnings of plantation workers.
[*Publs.*] *I.L.O.*, Geneva, 1955, pp. 99, 121, 121 and 81.

Report I, Item 1 (*c*) is concerned with, among other things, recent trends and developments in supply and demand and in prices and controls relating to coffee, tea, sugar, rubber, cacao, bananas, copra, hard fibres, palm oil, pineapples, cinchoma and tobacco. Report II discusses scientific and technical advances in crop production, the development of crop cultivation and productivity in plantations, the regulation of labour requirements for crop production, working and living conditions on plantations, and possible measures for improving these conditions and productivity on plantations. Report III deals, in part, with the instability of production and prices of plantation crops, with special reference to tea, rubber, sugar, coffee and cacao, through the seasonal characters of production, and year-to-year fluctuations in demand, supply and prices.

1070. JACKSON, T. H.
The reaction of some horticultural crops to climates in East Africa.
From summary *Pap. 14th int. hort. Congr.*, 1955, Scheveningen, *see note p. 4.*

Details are given of the reaction to temperature at different altitudes in Kenya of citrus, pineapples, lychees, olives and deciduous fruits. The hop is a long day plant and is unsuitable for growing in Kenya.—Hort. Sect., Kenya Dep. Agric., Molo.

1071. POPENOE, W.
Systematic pomology in tropical America.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Recent advances have mainly concerned vegetative propagation. The time is now ripe for attention to systematic pomology.—Esc. Agricola Panamericana. Tegucicalpa, Honduras.

1072. UNIVERSITY COLLEGE OF THE GOLD COAST, FACULTY OF AGRICULTURE.
Guide to the Agricultural Research Station, Nungua, 1955.
[*Publ.*] *Univ. Coll. Gold Coast Fac. Agric.*, 1955, pp. 30, map.

The agricultural Research Station at Nungua on the Accra plains is 2 years old. It is chiefly concerned with field crops and animal husbandry, but 13 flue-cured tobacco varieties from Southern Rhodesia are being tested, and irrigated experimental plots of sugar cane, pineapples, bananas and oil palms have been planted.

1073. BRAUN, W.
Katalog der bedeutenden Nektar- und Pollenpflanzen in Primavera, Alto Paraguay. **(List of important nectar and pollen plants in Primavera, Paraguay.)**
Dusenia, 1954, **5**(2): 61-7, from abstr. in *Bee World*, 1955, **36**: 213-14.

The information in this paper is based on 12 years' observations. Only angiosperms are dealt with, although one species of stingless bees has been seen to collect spores of ferns in the same way as pollen. Observations are given on plant geography, phenology, and the effect of environmental factors on nectar yield—for instance plagues of grasshoppers in 1945, 1946 and 1947 changed the flowering times of orange (*Citrus* sp.)

from August to October. In this tropical country there are many variants in flowering times; some plants bloom only once in several years, and the value to bees of the different plants is much less stable than in temperate districts. The list of bee plants (under botanical families) includes flowering times, habitats and other notes. There is some information on the behaviour of bees in relation to the different crops, and on their preferences for them.—Soc. frat. Hutteriana, Primavera.

1074. KEARNS, H. G. H., AND MORGAN, N. G.
Spray application problems: XX. Light-weight small power sprayers (34 and 70 c.c. I.C. engines).
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 138-46, illus.

Specifications of two small, simple, light-weight spray machines are given. One machine is fitted with a 34 c.c. 2-stroke engine and a ⅜ in. B.S.P. gear pump and weighs complete 33 lb., and a larger machine with a 70-80 c.c. 2-stroke engine and ½ in. B.S.P. gear pump weighs 55 lb. The 34 c.c. machine has a throughput of approximately 8 pints per minute at 75 lb. p.s.i. and the 70-80 c.c. machine 19 pints per minute at 75 lb. p.s.i. These spray machines can be carried and are primarily designed for a wide range of duties by native labour in the Colonial Territories. The design aims at simplicity of operation and maintenance. The engine depends on petrol/oil lubrication and the pumps are fitted with plastic bearings suitable for water lubrication. [Authors' summary.]

1075. STEINER, L. F., AND LEE, R. K. S.
Large-area tests of a male-annihilation method for oriental fruit fly control.
J. econ. Ent., 1955, **48**: 311-17, bibl. 2, illus.

Experiments in Hawaii have shown that infestations of the oriental fruit fly, *Dacus dorsalis*, can be reduced by 60 to 100% if male flies are destroyed before they can fertilize the females. In large area tests traps treated with methyl eugenol and parathion or Pyrolan attracted and killed millions of male flies and greatly reduced infestations of guava crops. [See also *H.A.*, 22: 4375.] For small areas, however, the method was not satisfactory.

1076. STEINER, L. F.
Bait sprays for fruit fly control.
Agric. Chemic., 1955 **10**(11): 32-4, 113, 115, bibl. 7, illus,

Poison-bait sprays that utilize a quick-acting organic phosphorus insecticide, such as malathion, in combination with certain acid or enzymatic protein hydrolysates have been developed in Hawaii for the control of the oriental fruit fly (*Dacus dorsalis*), the melon fly (*Dacus cucurbitae*) and the Mediterranean fruit fly (*Ceratitis capitata*). Recent studies in Mexico have also found them effective against the Mexican fly (*Anastrepha ludens*). With such sprays better control has been obtained with less insecticide than with conventional sprays, resulting in reduced costs, reduced hazards to people and very little destruction of parasites, predators, and pollinating insects. Bi-weekly applications of 4 lb. of 25% malathion wettable powder and 1 lb. of protein hydrolysate per acre in from 5 to 150 gal. of water have generally been found adequate for heavy infestations. Dilute and concentrated sprays gave equal results. The spray deposits attracted and killed flies for as long as 2 to 3 weeks. Most of the currently used fungicides destroyed or reduced the effectiveness of the sprays when mixed together. However, some fungicide sprays can be applied prior to bait sprays. Another means of controlling the oriental fruit fly was developed for use against isolated infestations. A 3% solution of Pyrolan in methyl eugenol attracted male flies from ½ mile or more, and by killing them reduced fertilization of females. Cane-fibre board feeding stations were impregnated monthly, and distributed at the rate of 30 to 40 per square mile, at a cost of 35 cents per acre for a 16-month period. A similar solution of DDVP in methyl eugenol was also effective. [From author's summary.]—U.S. Dep. Agric., Honolulu.

1077. DUMAS, P.
L'emballage carton et le conditionnement des fruits tropicaux. (**Cartons for the export of tropical fruits.**)
RIEUF, H.
Avenir de la caisse armée pour l'emballage des fruits tropicaux. (**Future of the reinforced box for packing tropical fruits.**)
Fruits d'Outre Mer, 1955, **10**: 432-4, illus., and 435-6.

Notes are given on a new French corrugated-cardboard box for the carriage of fruit by air. It takes 1-2 layers of fruit, has a capacity of 15 l. and measures 56 × 30 × 12 cm. It weighs 500 g. and 1,000 occupy 4 cu. m. The American 2/3 Florida citrus carton is being more widely used in the Mediterranean area. Reinforced plywood boxes are rapidly becoming more popular. Their use for various tropical fruits is discussed.

Banana.

(*See also* 1235 l, s.)

1078. OPPENHEIMER, C.
Banana growing in a marginal climate.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The banana in Israel has to stand 4 months unsuitably cold weather. What is sought is some method whereby the earliest possible differentiation of flowers and so the earliest effective flowering can be achieved. Premature flowering means, however, small bunches; excessively late flowering gives a large bunch but means potential damage to the fruit during its ripening in the winter. The problems involved are under study by the Meteorological Service. [See also *H.A.*, 25: 4345.] Lab. Hort. Plant Breed., Rehovot, Israel.

1079. DAUDIN, J.
Conseils pratiques à un planteur de bananes martiniquais. (**Advisory notes for banana planters in Martinique.**)
Bull. Inst. Fruit Agrumes colon., Stat. rég. Antilles franç., **13**, 1955, pp. 55, illus.

The subjects covered include preparation of site, planting, manuring, maintenance including weeding, removal of dead floral parts from the end of the fruit [see also *H.A.*, 24: 1929], desuckering, propping and protecting bunches against leaf friction and sunburn, disease and pest control, harvesting, packing and cutting back after harvesting.

1080. Nayar, T. G., and Bakthavathsalu, C. M.
Cavendish bananas—their culture and systematic status.
Indian J. Hort., 1955, **12**: 22-8, bibl. 11, illus.

The cultural practices applied to dwarf bananas are outlined for the important banana growing regions of the world, with special reference to South India. The Mauritius variety is described, and the specific status of the Cavendish group is discussed. Bud mutations are mentioned.—Central Banana Res. Stat., Aduthurai.

1081. O[sborne], R. E.
Investigations 1953. Spacing trials with Lacatan.
Bull. Dep. Agric. Jamaica, **53**, [undated], pp. 77-85.

Among preliminary conclusions drawn from several trials were: (1) The percentage decrease in bunch weight is more rapid than that in grade as spacings become closer. (2) In one locality wider spacings tended to result in shooting at a greater height; in other localities there were no differences in height. (3) The period taken for bunches to mature was markedly longer in all localities at densities of 810 plants per acre or more. (5) Densities of 810 and 1,000 give results inferior to lower densities, despite fertilizer applications in excess of basic requirements.

1082. Dumas, J.
Contribution à l'étude du développement du bananier nain. I. Les étapes du développement. **(Contribution to the study of the development of the dwarf banana. I. Phases of development.)**
Fruits d'Outre Mer, 1955, **10**: 301-26, bibl. 14, illus.

Studies on dwarf bananas at the IFAC central station in French Guinea and in France led to the recognition of several phases of growth in suckers detached from the mother plant. These are the vegetative phase which lasts up to the production of the 20th leaf, the floral phase which lasts from then until the production of the largest leaf, the fruiting phase which lasts from then until harvesting, and a possible pre-floral phase occurring between the appearance of the 15th and that of the 20th leaf. Two types of dwarf banana are considered to exist: (1) a very common type usually possessing 29, but never more than 32, leaves and (2) a much slower-growing type which produces 33-38 leaves and apparently initiates its inflorescence on production of the 25th leaf. The leaf development of suckers arising from a mother plant is controlled by the parent which inhibits growth in breadth during most of the vegetative phase, thus considerably reducing the leaf surface. Conclusions are: (1) Vegetative activity diminishes with age. (2) Few-leaved plants are the more active type and have the greater surface area per leaf. (3) A certain energy level is required for flowering and the nourishment of the fruit: this level is quickly attained by few-leaved plants, but less active plants have to produce extra leaves before reaching it.

1083. Alexandrowicz, L.
Étude du développement de l'inflorescence du bananier nain. **(A study on the development of the inflorescence in the dwarf banana.)**
Ann. Inst. Fruits Agrumes colon., **9**, 1955, pp. 32, bibl. 7, illus.

In *Musa sinensis* the number of flowers which develop into fruits is low in relation to the total number borne by an inflorescence and the number of hands is variable. The factors governing the initiation and development of the inflorescence were studied at Adiopodoumé in the Ivory Coast in 1952/53. In the early stages all flowers are potentially hermaphrodite, but they differentiate during development and in the emerged inflorescence the basal hands carry female flowers and the apical hands male flowers, although there may sometimes be a few hermaphrodite flowers between the male and female zones. The hands bearing female flowers number 6-12 and yield 75-220 bananas. Production of male flowers continues until the stem is mature. In one stem studied, there were 2250 flowers of which only 150-170 gave edible bananas. The number of female flowers formed depends on the amount of meristematic tissue, its functional capacity at the time of flower differentiation and the duration of this active period. In general, the number of flowers per hand diminishes progressively from the first to the last hand of female flowers, then frequently increases slightly, but becomes constant in successive male hands. Removal of the 5 basal hands as soon as the inflorescence emerged had no effect on the remaining hands. Other experiments confirmed that floral initiation begins when the total leaf area reaches a threshold figure. The investigations led to the conclusion that in the first phase of its life the banana plant absorbs freely, forms reserves of mineral elements and develops meristematic tissue commensurate with these reserves, and that in the second it employs the reserves and the meristem in the formation of flowers and fruit. The number of fruits thus depends on the amount of nutrients absorbed in early life, but their size depends largely upon the level of nutrition later in life. Yields can therefore be increased by proper treatment both before and after floral initiation.

1084. Champion, J., and Pélegrin, P.
L'urée-formol utilisé en bananeraie. **(The use of urea-formaldehyde in banana plantations.)**
Fruits d'Outre Mer, 1955, **10**: 327-9.

In experiments in French Guinea over 4½ years the total yield produced by urea-formaldehyde, applied at the rate of 240 kg. N per ha. per annum, was 178 tons per ha. compared with 150 tons from equivalent applications of ammonium sulphate. The total number of stems, the number of stems per plant and the average weight of stems per plant were all greater with urea-formaldehyde.

1085. S., G.
Notes on the banana borer weevil.
J. agric. Soc. Trin. Tob., 1955, **55**: 250-2.

The subjects covered are the life history of *Cosmopolites sordidus*, the damage it causes, the symptoms in the plant and control. Cultural control consists of (1) growing the plants in fertile, well cultivated, adequately manured soil, (2) planting borer-free suckers and (3) removal or chopping-up of stems after harvesting. Chemical control recommendations made in the light of current intensive research are, (1) soaking suckers in 2% aldrin for 3-6 hours depending on their size, (2) spraying the stem and the soil round its base with 2% dieldrin at 1-2 pints per plant according to size just before the beginning, and again before the end, of the wet season.

1086. DEULLIN, R., AND MONNET, J.
Le conditionnement de la banane dans l'Union française. (**The handling of bananas for export in the French Union.**)
Fruits d'Outre Mer, 1955, **10**: 397-403, illus.

The factors which govern the handling of bananas are variety, degree of maturity in relation to duration and means of transport, method of disposal and sale, the available packing materials, treatment of stems, the possibility of obtaining quick cooling and normal gaseous exchange between the stem and the surrounding atmosphere, and the need to protect the stem against desiccation, contamination and rots. It is considered that the method of shipping unpacked stems of Gros Michel from the Cameroons could be applied with modifications to Poyo Robusta but not to the dwarf banana.—I.F.A.C.

1087. REYNAUD, P.
Emballages rigides, pour le transport et la manutention des bananes. (**Rigid containers for the transport and handling of bananas.**)
Fruits d'Outre Mer, 1955, **10**: 448, illus.

A new type of container is described consisting of a flexible wooden latticework frame which can be wrapped round the stem.

1088. HULME, A. C.
The nitrogenous compounds of the banana fruit.
From abstr. in *Plant Physiol.*, 1955, 30 (Suppl.): xxvi.

Studies are reported on the changes occurring during the ripening of banana fruits. The 17 amino acids present in the alcohol extract were identified by paper chromatography. Unusually large amounts of *l*-histidine were present, although the acid hydrolysate of the protein contained only very small amounts of histidine, the principal basic amino acid in the protein being lysine. Changes in the alcohol soluble and insoluble fractions were also examined and will be reported later.—Cornell Univ., New York, and Ditton Lab., East Malling.

1089. ANON.
Paper from banana stems—cheapest raw materials for pulp.
Chem. Age, 23 July 1955, from abstr. in *Sci. and cult.*, 1955, **21**: 155.

The possibility is discussed of using banana stems for paper manufacture. Although the stems contain only 2% fibre, this low yield is compensated for by the cheapness of the process.

Cacao.

(*See also* 1234g, h, t, 1235a, b, e, g, j, r, v.)

1090. U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
Cocoa beans. World production and trade.
Foreign Agric. Circ. **FCB 7-55**, 1955, pp. 37.

World production for 1954/55 is now forecast [see *H.A.*, 25: 3257] at 1745 million lb., 8·9% more than the low world crop of 1953/54. The situation in the principal producing countries is discussed and tables give export and import figures. World production in 1955/56 is forecast at 1784 million lb. or 2·2% higher than for 1954/55. There is much evidence that a world-wide effort is under way to increase production. Although prices have been declining for several months and are much lower than the high levels reached in 1954, they are still attractive enough to encourage producers to expand and improve their production.

1091. THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.
A Report on Cacao Research 1954.
Imperial College of Tropical Agriculture, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, 1955, $10\frac{1}{2} \times 8\frac{1}{2}$ in., pp. 81, bibls., illus., 12s. 6d.

This report contains 15 papers on cacao investigations conducted in 1954. All of these are abstracted or noted separately below.

1092. COPE, F. W., AND BARTLEY, B. G.
Some aspects of the plant improvement programme.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 27-31, bibl. 2.

A large-scale plant improvement programme for cacao was begun in Trinidad in 1948 under the Cocoa Research Scheme. The factors at present considered important for improvement are discussed. They are yield, pollen compatibility, disease resistance with special reference to *Marasmius perniciosus* and *Phytophthora* pod rot, bean size, shell content, fat content and flavour. All promising clones should be given extensive regional trials before final acceptance. The best material which emerges from improvement studies will be the starting point for a second cycle of breeding from both local and introduced material.

1093. BURLE, —.
Note sur l'état actuel de la culture cacaoyère en A.O.F. et sur travaux effectués par le Centre de Recherches Agronomiques de Bingerville. (**Note on the present situation regarding cacao growing in French West Africa and on research at the Bingerville Agronomic Research Centre.**) [English summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 37-40.

Notes are given on cultural methods, production and yields in the Ivory Coast and on the selection of high-yielding types at the cacao experimental station at Abengourou. [See also *H.A.*, 24: 4288.]

1094. BRAUDEAU, J.
Travaux de sélection de la Station du Cacayoer de Nkoemvone. (**Selection work at the cacao station at Nkoemvone** [French Cameroons].) [English summary ¼ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1954, Tafo, pp. 71-4.

The station was opened in 1949 and now has a collection of 20,000 trees. Some 30 mother trees have been selected for propagation by cuttings and the performance of these selected clones is being studied.

1095. KNIGHT, R., AND ROGERS, H. H.
Recent introductions to West Africa of *Theobroma cacao* and related species. I. A review of the first ten years.
Emp. J. exp. Agric., 1955, **23**: 113-25, bibl. 13.

During the last ten years, various types of *Theobroma cacao* and related species from South America have been introduced to the Gold Coast. The characters and performance of these introductions and their progeny are reviewed. It is evident that these recent introductions from South America will, within the next two decades, have a considerable effect on cocoa production in the Gold Coast. The initial observations in the new progeny trials at the West African Cacao Research Institute give promising indications that still better varieties can be expected within the next 10 years. It is apparent that the results obtained from the 1944 introductions justify a further introduction of types not present at W.A.C.R.I. from Pound's collection in Trinidad.—[From authors' summary and conclusions.]

1096. ROGERS, H. H., AND KNIGHT, R.
Some observations on yield trials of cacao at Tafo. [French summary 5 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 42-5.

The layouts, methods of establishment and results of the progeny trials at Tafo are discussed, and the authors conclude that large complicated trials are not to be recommended where it is required to assess yield potential. A study of "pod distribution" is an indication of the efficiency of a trial.—W.A.C.R.I.

1097. ARCHIBALD, J. F.
Factors concerned in the rooting response of cuttings. [French summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 40-2.

The humidity of the air in the rooting bin is the most important factor. Low light intensities cause ultimate starvation of the cutting, although cuttings with leaves will produce roots in darkness. High light intensity also causes leaf breakdown. Temperature is not critical. The rooting medium affects the amount of callus produced and the quality of the root system. Considerable variation in rooting behaviour is shown between cuttings from: different clones, different trees of the same clone, different parts of the same tree and different parts of the same shoot, owing to internal factors. The amount of reserve food material at the time the cutting is taken and the photosynthetic efficiency of the leaf appear to determine the survival of the cutting. [From author's summary.]—W.A.C.R.I.

1098. PARKER, S. S.
A review of the techniques used in propagation of T.38 cacao by rooted cuttings in Nigeria. [French summary ⅓ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 85-9, bibl. 6.

The following factors have been found important in promoting successful rooting of both stem cuttings and single-leaf cuttings of the local selection T.38 in closed bins: (*a*) The selection of cacao material from nurseries where conditions of light and nutrition are controlled. (*b*) The application of specific concentrations of NAA and IBA. (*c*) The use of hardwood sawdust as the rooting medium. (*d*) Correct watering. (*e*) Shading to reduce light intensity to 25%. The following factors are found to be important in promoting successful rooting of stem cuttings in open bins with mist spray: (*a*) The use of composted sawdust as rooting medium. (*b*) Shading to reduce light intensity to 25%. [From author's summary.]—Dep. Agric., Nigeria.

1099. FENNAH, R. G.
Disinfestation of rooted cacao cuttings.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 47-9, bibl. 1, illus.

Fumigant treatment of rooted cacao cuttings at 30 g. HCN per 1,000 cu. ft. at temperatures ranging between 86° and 89° F. and a relative humidity of 80-100% for 24 hours gave complete kill of insects and caused no damage to the plants. At a dosage of 60 g. all arthropods were killed and some leaves were injured. Above this level leaf injury was severe. Methyl bromide at 2,934 ml. to 1,000 cu. ft. in a 15-minute treatment was effective against arthropods and caused only slight foliar injury. Longer exposures were seriously phytotoxic. Of the other treatments tried for the purpose of disinfestation the use of BHC smoke generators failed to give control of mealybugs (*Pseudococcus*) at a level which caused defoliation of the cuttings. Contact sprays of white oil and parathion (1·5% plus 0·007% respectively) were effective against insects which they happened to reach and were not phytotoxic, but were ineffective against *Pseudococcus* and diaspine scale-insects in concealment. [Author's summary.]

1100. MURRAY, D. B.
An anti-transpirant for cacao.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 44.

In a trial planted in the dry season without shade plants sprayed with Goodrite Latex VL-600, a modified vinyl resin, survived longer and lost their leaves later than untreated plants. In another trial there was some evidence of phytotoxicity in the case of very young flush leaves. VL-600 may prove of use with valuable clonal material in helping the plant to survive a short spell of dry conditions. It has also been used for the shipment of bare rooted cuttings and in establishing rooted cuttings from propagators.

1101. ALLEN, E. F., AND WHITEHEAD, C.
The use of veneer tubes for raising cacao seedlings.
Malay agric. J., 1955, **38**: 92-5, bibl. 2, illus.

The tubes, 15 in. high and 4½ in. in diameter, are made of single-ply veneer held in position by a wire round each end. Seeds are sown one per tube in potting compost and the resulting seedlings are planted out in the tubes which are then removed from the ground with a sharp jerk. The tubes are cheaper than baskets and can be used more than once.

1102. MURRAY, D. B.
Periodicity of cropping in young cacao cuttings.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 43-4, bibl. 2.

In Trinidad the main cacao crop from mature trees is harvested from November to January, i.e., at the end of the rainy season, and the late crop in May and June at the end of the dry season. It has been observed, however, that the cuttings on first coming into bearing tend to produce most of their crop in the May-June period, giving little, if any, December crop. In 2 trials at River Estate the total annual crop of ICS 1 showed considerable seasonal variation from the 2nd to the 12th years from planting, but the proportion of the crop borne in May and June declined progressively with age. Intensity of shade is a factor concerned in this periodicity. Experimental data show that light intensity is of greater importance than physical age, heavily shaded plants producing a greater proportion of crop in the December period than unshaded plants of the same age. It remains to be determined whether cacao needs a period of adverse conditions to stimulate flowering and fruiting or whether it combines vegetative and reproductive functions best under a completely uniform environment.

1103. Murray, D. B., and Cope, F. W.
A stock-scion experiment with cacao. II.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 37-42, bibl. 3.

In a stock-scion experiment with cacao involving four clones as stock and scion in all combinations, the stock and scion girths have been used to investigate the early growth of the various combinations. In general, a clone produces a greater effect on growth when used as a scion than when used as a stock. No simple pattern of behaviour exists between the various combinations, the stock-scion interactions varying with the different clones. Early yields are influenced by both stock and scion but bear no relation to the girth of either stock or scion. [Author's summary—see also *H.A.*, 24: 1946.]

1104. Benstead, R. J.
Cacao re-establishment. [French summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 95-8.

Following a short discussion of methods being used to replant cacao, a list is given of indigenous forest trees found suitable or unsuitable for use as shade. [See also *H.A.*, 22: 1892.]—W.A.C.R.I.

1105. Goodall, D. W.
Growth of cacao seedlings as affected by illumination.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Growth of Amelonado cacao in full light was compared with that kept under 4 intensities of artificial shade—up to the age of 30 weeks. Results are recorded and discussed.

1106. Murray, D. B.
A shade and fertiliser experiment with cacao. IV.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 32-6, bibl. 4.

The effect on yield of removing the shade from cacao previously grown at light intensities of 15%, 25%, 50%, 75% and 100% of full light is described. Shade removal led to an increase in crop in the following year when the plants had previously been growing at low light intensities. The increase in crop was not evenly spread through the cropping season, but appeared in the period of the late crop, May-June. The amount of increase in crop was related to the mineral nutrition of the plant. Plants previously heavily shaded showed a response to nitrogen on removal of shade. Plants previously growing at high light intensities, however, showed little response to nitrogen, but a marked response primarily to potash, secondarily to phosphate. The significance of this is associated with increased growth and self-shading of the plant. The theoretical requirements for the early years of growth of young cacao are discussed. The most important single factor is shade, which should be heavy at first and gradually reduced. Nitrogen manuring reduces the ill-effects of too little shade, but once a complete canopy is established no further response is secured to its application. Other nutrients then become limiting, namely K and P, on the soil in question. [From author's summary—see also *H.A.*, 22: 3039, 24: 866 and 1949, and 25: 2127.]

1107. Havord, G., Maliphant, G. K., and Cope, F. W.
Manurial and cultural experiments on cacao. Part IV. The effects of fertilisers, shade and spacing on flowering, fruit-set and cherelle wilt. River Estate, Trinidad.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 58-64, bibl. 25.

The 1953/54 results are presented of the shade, spacing and fertilizer experiment (No. 1) laid down in 1949 [see *H.A.*, 24: 864 and 1948, and 25: 2129.] Observations of flowering, fruit set and cherelle wilt have provided data on the effect of the experimental treatments at different stages of the fruiting cycle. It is apparent that the effects of fertilizers at different stages of the fruiting cycle are complex and often profoundly modified by the presence or absence of overhead shade and by the spacing of the cacao trees. Close-spaced trees have outyielded wide-spaced trees in crop per acre, but have proved markedly inferior in single tree performance, flowering and cherelle wilt being adversely affected. There have been positive yield responses to N, especially in unshaded and wide-spaced plots, but there has been negative response in the shaded, close-spaced plots (i.e., those most heavily shaded). N has enhanced flowering and, in addition, has reduced cherelle wilt in the wide-spaced plots, but has increased it in the close-spaced plots. Under certain conditions of shade and spacing, P has exerted a small beneficial effect on all stages of the fruiting cycle. K has reduced cherelle wilt in shaded plots, but has increased it in unshaded plots, especially in the absence of N. Generally, increased yield has been associated with decreased weight of wet cacao per pod. The present results are discussed in relation to previous work on similar subjects, and it is suggested that the marked interaction between shade, spacing and fertilizer responses may, in part, explain discrepancies between past and present results.

1108. Havord, G.
A note on soil heterogeneity and the growth of cacao.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 69-71, bibl. 4.

Very localized soil variations may be a factor responsible for the wide variability in performance from tree to tree which is a pronounced feature in Trinidad cacao. Poor growth in part of Experiment I at River Estate [see preceding abstract] was found to be due to the existence of a horizon of impeded drainage at 15-21 in. Investigations led to the conclusion that in this region the soil is characterized by lenses of compact material varying in thickness and extent. The problem was overcome by sinking pits, 6-10 feet deep, into the gravel beneath and running surface drains into them.

1109. Havord, G., Maliphant, G. K., and Cope, F. W.
Manurial and cultural experiments on cacao. Part V. River Estate, Trinidad.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 65-8, bibl. 3.

The 1953/54 results are presented of experiments II, III and IV laid down in 1949 and 1950, namely, a leguminous *vs.* non-leguminous shade trial with ICS. 1, 8, 16 and 98, a spacing, mulching and trenching (filled with pen manure) trial with ICS. 1, 6, 8 and 60, and a tillage and manurial trial with ICS. 1 and 45 [see *H.A.*, 24: 864]. (II) There were no significant differences between the shade treatments. N caused a slight response. (III) In 1952/53 the closer spaced plots (7·2 × 7·2 feet) far outyielded the wider spaced plots (9 × 9), but in 1953/54 the yields were similar, namely, 461 and 457 lb. per acre respectively. The yields for trenching, cut brush and bagasse were 526, 452, and 342 lb. dry cacao per acre respectively compared with 517 in the control. (IV) The factors involved in this experiment are (*a*) land untouched *vs.* hand forking *vs.* shallow mechanical ploughing, and (*b*) control *vs.* chemical fertilizer *vs.* pen manure plus chemical fertilizer *vs.* grass mulch plus chemical fertilizer. With ICS. 1, the mean yield of all uncultivated plots was significantly greater than those of both cultivated and handforked plots, because bush mulch only gave a significant increase in yield over the other three manurial treatments on uncultivated plots. Although there were no significant effects with ICS. 45, responses followed the same trends as with ICS. 1. The main feature of the 3 trials were the wide differences in the performance of different clones under varying conditions, and the implications of this are discussed.

1110. Richards, A. V.
Cacao.
A.R. Ceylon Dir. Agric. 1954, 1955, p. 58.

In a manurial trial on K-rich soil at Kundasale P caused a large increase in yield while K tended to depress it. The average weights of cured cacao per tree were 32·5 oz. with no fertilizer, 46·0 with P, 35·3 with K, 30·0 with PK and 31·6 with NPK.

1111. Havord, G.
Lime-induced chlorosis of cacao seedlings.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 72-6, bibl. 12.

A pot experiment was carried out to determine the effects of improving the organic status of a highly calcareous soil and of deliberately over-watering the plants on the development of chlorosis in cacao seedlings. It demonstrated that seedlings can be grown in a soil containing as much as 30% calcium carbonate, provided it has an adequate organic content either as a surface layer or incorporated in the soil. Under these conditions, only slight chlorosis developed and this only while leaves were young, and the symptoms became negligible if the plants were watered sparingly.

1112. Kandiah, S.
Sickle leaf of cacao.
A.R. Ceylon Dir. Agric. 1954, 1955, p. 49.

Marked recovery of cacao from sickle leaf was achieved by the combined application of dolomitic limestone and zinc sulphate. There is evidence that heavy dressings of potash induce sickle-leaf symptoms.

1113. van der Knaap, W. P.
Observations on the pollination of cacao flowers.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

The problems are considered under the following headings: natural pollination, natural cross pollination, pollination and position of flowers, and selfing on a self-incompatible tree. Both self-incompatibility and insufficient natural pollination of cacao flowers are factors which limit cacao yield. [See also *H.A.*, 24: 4300].—Exp. Stat. C.P.V., Bogor, Indonesia.

1114. Murray, D. B., and Nichols, R.
The effect of maleic hydrazide sprays on cacao seedlings and rooted cuttings.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 45-6, bibl. 2, illus.

The morphological effects of maleic hydrazide appear to differ in seedlings and cuttings. In the former it would seem to act as an anti-mitotic inhibiting the development of the terminal flush of leaves. In cuttings, on the other hand, the morphological abnormalities point to an anti-hormone effect. Further work is necessary before the significance of these effects can be explained. [Authors' conclusions.]

1115. Meiffren, —.
Note sur l'étude de la protection des cacaoyers contre les insectes et les maladies en A.O.F. **(A note on studies on cacao pest and disease control in French West Africa.)** [English summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 6-8.

Investigations on the major pests and diseases of cacao in the Ivory coast are briefly described. These include: (1) *Scolytidae* notably *Xyleborus morstatti, attacking young plants.* The most serious damage has been observed in cases where the taproot meets a gravel layer just below the soil surface and choice of suitable sites for planting is therefore most important. (2) *Capsids.* Young plants can be protected by the use of fairly dense shade and by painting them with a strong DDT emulsion. Tests of apparatus for the application of DDT to older trees are in progress. (3) *Coccid vectors of swollen shoot.* A survey of mealybug parasites has commenced. (4) *Swollen shoot disease.* The present distribution of the disease is given. (5) *Pod diseases.* Investigations are designed to indicate the optimum times for spraying with fungicides and to determine the losses due, respectively, to infection of cushions, of young pods and of mature pods.—Centre Rech. agron. Bingerville.

1116. Benstead, R. J.
Swollen shoot disease—W.A.C.R.I. [French summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 25-8.

Where continuous disease control was practised on an area with low initial infection the loss from swollen shoot disease was 2·74% of the original tree population in the six-year period 1940-45 (2·20% diseased and 0·54% contacts). Where no control measures were taken during the same period 32·14% of the original tree population was lost (22·78% diseased and 9·36% contacts). In a second six-year period (1945-1951), losses were as follows: (*a*) High initial infection treated from the beginning of the period—42·58%, and (*b*) low initial infection with continuous treatment—7·63%. On the plot where there was unrestricted natural spread from 1940 to 1951 the losses amounted to 92·2% of the original population. Rehabilitation by concurrent "cutting-out" and replanting is practicable with strict supervision. On the Old Station only 0·3% of the estimated seedling population has become infected in eight years and at Koransang, where there was a high initial infection (42·80%), the figure was 0·48%. Where re-establishment followed complete clearing infection has been confined to the perimeter of the block. [From author's summary.]

1117. Posnette, A. F., and Todd, J. M.
Virus diseases of cacao in West Africa. IX. Strain variation and interference in virus 1A.
Ann. appl. Biol., 1955, **43**: 433-53, bibl. 14.

Cacao virus 1A, the most important and prevalent of the viruses that attack cacao in the Gold Coast, occurs in strains that differ widely in their virulence towards cacao. Outbreaks usually contain trees infected with different strains and individual trees are often infected simultaneously with more than one strain. Neither mild nor virulent strains seemed to be consistently dominant in roots or in other parts of cacao trees. Cacao plants infected with mild strains were nearly always protected against the effects of infection by virulent strains: however, virulent strains entered hosts already infected with mild strains, but usually without causing any symptoms unless the plants were coppiced. The severe symptoms that developed on new growth from such coppiced plants were seldom repeated in later growth. In the field, infection with a mild strain protected mature trees against the effects of virulent strains spread by mealybugs. Five years after infection with the mild strain, trees were yielding 1 pod per tree more than in the year they were infected, whereas the decrease on trees infected with the virulent strain was 16 pods per tree. Some limitations in the practical application of protection by mild strains and objections to its use as a control measure are discussed. [From authors' abstract.]—W.A.C.R.I.

1118. Nicol, J.
The control of mealybug vectors of cacao swollen shoot virus. [French summary 19 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 18-20.

Notes are given on preliminary experiments on control by spraying or tree injection with dimefox [see *H.A.*, 24: 3132]. Over half a million non-indigenous parasites representing six different species have been released in five localities in the Gold Coast. There is evidence of limited establishment of one species but none has, so far, become permanently established.—W.A.C.R.I.

1119. Desrosiers, R., Von Buchwald, A., and Bolaños, C.
Effect of rainfall on the incidence of monilia pod rot of cacao in Ecuador.
FAO Plant Prot. Bull., 1955, **3**: 161-4, bibl. 3.

A close relationship is shown to exist between the amount of rainfall occurring during the early stages of pod formation and the incidence of monilia pod rot found as the pods approach maturity. This lends support to the theory that monilia infection takes place during the period of flowering and very early development of the pods. This information can have a very important bearing on the development of control measures and on the selection of clonal varieties which will escape serious infection.—[From authors' conclusions.]—Trop. Exp. Stat., Pichilingue, Ecuador.

1120. Desrosiers, R.
Diversidad genética del cacao como base en la selección de resistencia a la enfermedad de la escoba de bruja. **(Genetical differences in cacao as a basis for breeding for resistance to witches' broom disease.)** [English summary 21 lines.]
Turrialba. 1954, **4**: 131-4, bibl. 7.

Variations in the resistance of the different types of cacao to witches' broom disease (*Marasmius perniciosus*) suggest that 3 procedures may be used for the development of resistant clones. These are: (1) developing clones direct from Forastero, certain varieties of which are highly resistant; (2) selecting from Trinitarios [see *H.A.*, 24: 2142]; (3) crossing Forasteros with high-quality Criollos and Cacao Nacional of Ecuador.

1121. Holliday, P. C.
A test for resistance to *Marasmius perniciosus* Stahel.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 50-5, bibl. 12, illus.

A description is given of an inoculation technique for testing the resistance of cacao to witches' broom disease. It is considered that it will be of use in breeding programmes and in studies of the inheritance of resistance. The test indicated that resistance is physiological and depends on hypersensitivity in the host plant.

1122. Buyckx, E.
Observations sur le "faux chancre" des branches du cacaoyer. **(Observations on false canker of cacao branches.)** [English summary ¼ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 58-60, bibl. 2.

Insect damage was the primary cause of branch and trunk canker, sometimes accompanied by dieback, of young cacao at Yangambi. It was concluded that cacao can successfully resist the fungal agents of dieback under favourable environmental conditions but is susceptible under adverse conditions.—[From author's summary.]—I.N.É.A.C.

1123. Nicol, J.
The capsid problem. [French summary 7 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 51-2, bibl. 4.

The damage caused to cacao by capsids and the part played in the production of die-back by the fungus *Calonectria rigidiuscula* are discussed. The various types of damage done by these insects to young and mature cacao are described and the world-wide aspect of the problem is briefly considered. [Author's summary.]—W.A.C.R.I.

1124. Nicol, J.
Chemical control of cacao capsids. [French summary 18 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 49-51, bibl. 3.

Some of the new dusting and low-volume spraying equipment may be suitable for use on peasant farms, and co-operative or government ownership of the machinery should be feasible. The application of a 2·5% DDT emulsion at the branch unions and jorquettes of young cacao in the heat of the day can ensure considerable freedom from damage. The use of sprays and dusts on mature cacao is discussed. [See also *H.A.*, 25: 3263.]—W.A.C.R.I.

1125. Fennah, R. G.
The epidemiology of cacao-thrips on cacao in Trinidad.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 7-26, bibl. 27.

Detailed studies are reported on the factors affecting the abundance of cacao-thrips, *Selenothrips rubrocinctus*. The author summarizes his conclusions as follows: "The annual increase in the cacao-thrips population of cacao fields in Trinidad is considered to be determined primarily by the increasing availability, as the wet season progresses, of foliage in a condition suitable for food. The condition is thought to be associated primarily with retarded protein synthesis and an enfeebled protein-stabilizing mechanism. It is postulated, (1) that a single incision of such "conditioned" leaf tissue will yield a greater supply of food in solution than a single incision of leaves in which protein synthesis is not retarded and the protein-stabilizing mechanism is functional to its highest degree, and, (2) that cacao-thrips multiplication at its highest rate can take place only when feeding is efficient. All the data are examined in the light of this hypothesis, and the effect of specific relevant factors is evaluated. Observations which have led other workers to reject the view that cacao-thrips attack on cacao is secondary are discussed, and it is shown that they are accommodated within the framework of the general scheme."

1126. Cerbulis, J.
Carbohydrates in cacao beans. II. Sugars in Caracas cacao beans.
Arch. Biochem. Biophys., 1955, **58**: 406-13, bibl. 35.

In addition to the compounds previously determined [see *H.A.*, 24:3124], the following have now been found in Caracas cacao beans: planteose, verbascotetraose verbascose, a heptose, 3 oligosaccharides, several unidentified sugars, free glycerol, *meso*-inositol and an unidentified sugar alcohol.—Stephen F. Whiteman and Son, Inc., Philadelphia, Pa.

1127. de Witt, K. W.
The flavour assessment of cacao.
A.R. Cacao Res. I.C.T.A. 1954, 1955, pp. 77-81.

The operation of a tasting panel, where the available tasters are not familiar with the cacao trade and where there is no satisfactory single standard of reference, has been described. The essential feature of the method is the large number of samples which are tasted in a season. The great variation between tasters renders it necessary to compare tasting performances in detail, using a large number of assessments. Hence it follows that some suitable system for recording assessments for ready reference, such as the clip-card system used here, is also desirable. Experiments are at present in progress on the application of statistical analysis to tasting results. In the meantime, it has for the first time become possible to offer tentative guidance on the selection of clones for quality from the thirty already examined. It is appreciated that, on the whole, the clonal samples do not reach the standards of the best Trinidad and Grenada plantation cacaos; investigations are proceeding to determine whether the difference is due to a difference between seedling and clonal cacaos, or whether it is artefact, due to the differences in fermentation. On the other hand, with the exception of one clone, ICS 48, it is clear that the clonal material is not actively undesirable, and that it can be fermented to give a good saleable cacao. [From author's conclusions.]

1128. Taubert, A.
Beeinflussung des Kakaogeschmacks und -aromas durch technologische Vorgänge. **(The influence of technological processes on cocoa flavour and aroma.)**
Gordian, 1955, **55**(1310): 24-6, (1311: 17-20, (1312): 16-18, (1313): 14-16, bibl. 15.

While the paper is written chiefly for the manufacturer who has to produce a uniform quality of cocoa from beans of variable quality, some aspects of bean biochemistry are also dealt with. It was found that flavour is largely determined by low-molecular fatty acids, each acid having a distinct action. It is believed that derivatives of anthocyanin and catechins are esterified by these acids. The effect of fermentation and drying on flavour is also briefly discussed.

Cinchona.

1129. Copet, A., Jammar, M., and Neybergh, A. G.
Le traitement des écorces de quinquina et la fabrication des sels de quinine au Kivu. **(The extraction of cinchona bark and the manufacture of quinine salts in Kivu.)** [Flemish summary ⅓ p.]
Bull. agric. Congo Belge, 1955, **46**: 831-8, bibl. 1.

In a trial extraction of 200 tons of *Cinchona ledgeriana* bark the anhydrous quinine content averaged 6·086% and the rate of extraction was 83·5% of the total content.

Cloves.

(*See also* 1234w.)

1130. Maistre, J.
Le giroflier à Madagascar et Zanzibar. **(The clove tree in Madagascar and Zanzibar.)** [English and Spanish summaries 12 and 13 lines.]
Agron. trop., 1955, **10**: 413-48, bibl. 17, illus.

The subjects covered include areas cultivated, morphology, ecology, species and varieties, propagation, planting, shade, cultural practices, pruning, manuring, diseases and pests, harvesting and yields, processing, products, and production trends and expansion.

1131. Rabechault, H.
Sur l'anatomie du giroflier. *Syzygium aromaticum* (L.) Merrill et Perry. **(Anatomy of the clove tree, *Syzygium aromaticum*.)** [English and Spanish summaries 12 lines each.]
Agron. trop., 1955, **10**: 449-84, bibl. 31, illus.

A detailed, well-illustrated account is given of the anatomy of the root, branch, trunk, leaf, peduncle, flower, fruit and seed, and of the morphology of the oil glands.

Coconuts.

(*See also* 55, 828, 1263.)

1132. Pieris, W. V. D.
Wealth from the coconut.
Ure Smith, 166 Phillip St., Sydney, 1955, 8 × 5½ in., pp. 39, illus.

The author is a Technical Officer of the South Pacific Commission and this booklet is published in association with the Commission's Literature Bureau. It provides simply written advice, supplemented by many illustrations, on the selection of mother palms and seed nuts, nursery practices, planting and after-care of seedlings.

1133. John, C. M., and Satyabalan, K.
A note on the important coconut varieties of the Laccadive Islands.
Indian Coconut J., 1955, **8**: 65-73, illus.

Information is given on 3 Laccadive varieties, which should, it is believed, prove as good as the West Coast Tall variety of India when grown under suitable conditions.

1134. Jacob, K. C.
A new variety of coconut palm.
J. Bombay nat. hist. Soc., reprinted in *Indian Coconut J.*, 1955, **8**: 92-3, bibl. 4, illus.

A type in which the production of unbranched inflorescences is a heritable character is regarded as a distinct variety, *Cocos nucifera* var. *spicata*.

1135. Kutty, O. V. U.
External characters of seed coconuts and the quality of seedlings.
Indian Coconut J., 1955, **8**: 74-8.

Studies showed: (1) When seed nuts are planted vertically the retention of perianth parts prevents water collecting in the perianth cavity and rotting the embryo. (2) Seednuts with cracks at the stigmatic end are more subject to termite attack and produce less vigorous seedlings than uncracked nuts.—Agric. Res. Stat., Nileshwar.

1136. Kurup, P. G.
Weed control in coconut gardens.
Bull. Indian centr. Coconut Cttee, 1955, **9**: 40-2, bibl. 4.

The effects of weeds on coconuts are discussed. Cover crop experiments at 3 research stations have shown that *Calopogonium mucunoides* effectively and rapidly controls weed growth and soil erosion in coconut plantations and grows successfully under dense shade. Advice is given on its culture.

1137. Menon, K. P. V., and others.
Aerial roots in the coconut palm.
Indian Coconut J., 1955, **8**: 79-91, bibl. 24, illus.

A brief account is given of the structure, origin and development of aerial roots in the coconut. These are classified into 4 groups according to their positions, which range from the base of the stem to the base of the branches. The possible factors responsible for aerial rooting are root disease, adverse soil conditions especially waterlogging, surface planting, late transplanting, formation of branches and bulbils and old age. Aerial rooting may be induced by heaping a rooting medium round the base of the stem and watering frequently, by causing the palm to fall by severing the roots at one side and burying the fallen stem, and by marcottage. In marcottage at the Central Coconut Research Station, Kayangulam, a wooden box 3 ft. × 3 ft. × 3 ft. is fixed about the stem at a point previously ringed, and filled with river sand, coir dust and rich soil which is watered regularly. May/June is the best season for treatment and in some trees numerous roots are produced in 5–6 months.

1138. Sayeed, P. M.
Some observations on the shedding of buttons in the coconut.
Indian Coconut J., 1955, **8**: 49-57, bibl. 6.

Investigations led to the following conclusions: (1) Shedding is not due to deficient pollination, deficient nutrition or attack by pests or fungi. (2) It extends from the 3rd to the 20th week after the opening of the inflorescence, occurs most commonly within 6 weeks of stigmatic receptivity and is at its maximum in the 2nd to 4th week. (3) It is high during the south-west monsoon and uniformly low during the cold season. (4) In the West Coast Tall variety about a third of the buttons shed have 3 or 2 fertilized ovules, about a half have one and 16% none. (5) In all but one of 6 exotic varieties, by contrast, about two-thirds of the buttons shed have 3 fertilized ovaries and none are unfertilized. (3) The rate of insect and disease attack and of rot is much higher in the exotic varieties than in the West Coast Tall. [For earlier work see *H.A.*, 24: 1971.] —Agric. Res. Stat., Nileshwar.

1139. Nirula, K. K.
The cockchafer pest of coconut palm.
Bull. Indian centr. Coconut Cttee, 1955, **9**: 8-10, illus.

The grubs of *Leucopholis coneophora*, feeding on the roots of young coconut palms, are doing serious damage in certain areas on the west coast of India. Satisfactory control can be obtained by an annual application of 5% BHC dust at 56 lb. or 5% chlordane dust at 28 lb. per acre ploughed or dug in. Ploughing or digging alone gives some control.

1140. Plank, H. K.
Life history, habits, and control of the coconut rhinoceros beetle in Puerto Rico.
Bull. P.R. fed. Exp. Stat. Mayagüez, **45**, 1948, pp. 35, bibl. 24, illus. [received 1955.]

Investigations on the life history and control of *Strategus quadrifoveatus* in Puerto Rico are described. Control measures discussed are hand collection, trapping, insecticides, biological control, protectors and repellents, grove sanitation and other cultural methods.

1141. PIERIS, W. V. D.
The manufacture of copra in the Pacific Islands.
Tech. Pap. S. Pacific Commiss., **82**, 1955, pp. 37, illus., 6s.

Various copra drying methods and driers are described and illustrated, namely, sun drying, smoke driers, the standard Ceylon drier which is said to produce the best commercial copra, the Ceylon-type driers in use in the South Pacific, and hot-air driers. The driers recommended for use in the South Pacific are (1) the standard Ceylon drier for large and small-scale drying (scale diagram presented), (2) the Seychelles hot-air drier for small-scale drying (diagram), (3) the New Guinea or German drier for large and small-scale drying (diagram), (4) the Pearson's Patent hot-air drier for large-scale drying, and (5) the Chula hot-air drier for large-scale drying (photograph). The use of concrete barbecues is strongly recommended and building instructions and a plan are provided.

Coffee.

(*See also* 1202, 1234b, d, l, s, v, 1235i, u, 1262.)

1142. U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
World coffee production for 1955-56 forecast at 45·0 million bags.
Foreign Crops and Markets, July 11, 1955, partly reprinted as *Foreign Agric. Circ. FCOF* **7-55**, 1955, pp. 6.

Total world production of green coffee for the marketing year 1955/56 is forecast at more than 45·0 million bags of 132·276 lb. each. This is 11% and 6% respectively higher than the forecasts for 1954/55 and 1953/54, and 8% higher than the pre-war average. Primary increases of production during the coming season are expected in Brazil, Colombia, Mexico and French African territories. Exportable production from the 1955/56 crop is forecast at 36·7 million bags, compared with 32·3 for 1954/55 and 33·5 for 1953/54. Tables give production in the principal producing countries. The market situation is also discussed.

1143. STEVENS, W. L.
Estimation of the Brazilian coffee harvest by sampling survey.
J. Amer. statist. Ass., 1955, **50**: 775-87.

This article describes the results of an investigation, carried out on behalf of the *Instituto Brasileiro do Café*, into possibilities of estimating the Brazilian coffee crop by means of a permanent sampling survey. The state of São Paulo already has a general sampling survey for the principal crops. With some modification, this would furnish estimates with adequate precision for coffee. In the states of Minas Gerais, Rio de Janeiro and Paraná, there exist registers of property owners suitable for use as frames. From them could be constructed indexes of coffee growers, so that the primary sample would be drawn from this index, with a supplementary sample from the remainder. From data of the pilot survey, an estimate is made of the volume of work which would be needed. The state of Paraná has recently been surveyed by aerial photography. It was found that this photograph provides a very satisfactory frame for sampling. The state of Espírito Santo possesses no register of property owners, and it is suggested that the sampling survey in that state will have to await a survey by aerial photography. [Author's abstract.]—Univ. São Paulo.

1144. LAINS E SILVA, H.
Nota sobre o heteromorfismo folear do *Coffea canephora* Pierre var. *gossweileri* Chev. **(Note on leaf heteromorphism in *Coffea canephora* var. *gossweileri*.)**
Rev. Café portug., 1955, **2**(6): 34-6.

The wild coffee of Angola, *Coffea canephora* var. *gossweileri*, displays a high degree of leaf heteromorphism. A study was made of the leaves of 4 plants of a common type in the collection at Gabela. The statistical results showed highly significant differences in 6 of the 8 characters studied, namely, width of blade, length of leaf tip and of petiole, leaf index (length of blade divided by its width), number of pairs of veins, and angle of midrib with the middle secondary vein, and significant differences in length of blade and angle of base of blade.

1145. TROJER, H.
Distribución y características de la precipitación en un cafetal bajo sombrio. **(The distribution and characteristics of the rainfall in a shaded coffee plantation.)**
Bol. inf. Colombia, 1955, **6**: 256-64, bibl. 4.

Investigations in a coffee plantation shaded by *Inga santafereno* gave the following results: (1) Falls of less than 0·3 mm., recorded above the shade trees, penetrated moderate shade and reached the coffee's foliage. (2) Falls of 0·5 mm. penetrated dense shade. (3) Falls of 1 mm. reached the soil. (4) With falls of up to 8 mm. the percentage of the total rainfall recorded under the coffee was less than that recorded under the shade. (5) With falls of 10 mm. or over the percentage recorded under the coffee was greater than that recorded under the shade.

1146. SUAREZ DE CASTRO, F., AND RODRIGUEZ G., A.
Perdidas por erosión de elementos nutritivos, bajo diferentes cubiertas vegetales y con varias prácticas de conservación de suelos. **(Losses of nutrient elements from soil through erosion under various plant covers and conservation practices.)**
Bol. téc. Fed. nac. Cafet. Chinchina, 1955, **2**(14): 1-23, bibl. 9.

Mineral element losses from land under the following treatments were studied for 5 years: (1) bare soil on a 22% slope; (2) grass on a 22% slope; (3) young coffee on a 45% slope; (4) old coffee on a 55% slope; and young coffee on a 45% slope with (5) individual terraces, (6) *Indigofera endecaphylla* cover, and (7) individual terraces. Figures are given for the annual, average annual, and average monthly losses of N, P, K, Ca and Mg. The results were: (1) Losses considerably exceeded those reported for agricultural land in the temperate zone. (2) The amounts of Ca and Mg lost exceeded those removed in harvesting. (3) P losses were very small but were important because of the poverty of Colombian soils in this element. (4) Nutrient losses from bare soil were 7 times those from grassland, 25 times those from young coffee and 50 times those from 20-year-old coffee. (5) There were annual and seasonal cycles of losses correlated with the amount and distribution of the rainfall respectively. [See also *H.A.*, 24: 3158.]

1147. M[oss], R. I.
Investigations 1953. Coffee.
Bull. Dep. Agric. Jamaica **53**, [undated], pp. 132-6.

Mulching and fertilizer trial: The results from 4 crops show that the advantage of mulch over control is lessening with each successive crop and that the fertilizer plants are just beginning to show an advantage over the other treatments. *Minor element deficiency:* 1 lb. chelated iron compound per tree worked into the soil caused complete disappearance of chlorosis in 3 weeks.

1148. Hastings de Gutiérrez, L.
Muerte decendente causada por *Colletotrichum* en las plantas de café en el almácigo y su combate por medio de aspersiones en Turrialba, Costa Rica. (***Colletotrichum* dieback in coffee seedlings in the nursery and its control by spraying in Turrialba, Costa Rica.**) [English summary 18 lines.]
Turrialba, 1954, **4**: 115-24, bibl. 17, illus.

In trials with 7 fungicides 70% fermate gave the best control of *Colletotrichum coffeanum*, which causes serious leaf spotting and defoliation and dieback of the terminal and lateral branches of coffee seedlings. Weekly or fortnightly applications at 2% significantly reduced leaf infection and dieback and significantly increased leaf retention and stem diameter increase compared with the controls. Zerlate and dithane gave good results in some cases, but copper sprays proved phytotoxic when applied weekly.

1149. Fraselle, J. V.
La pourriture interne de la tige du caféier robusta. **(Robusta stem rot.)**
Bull. Inf. INEAC, 1955, **4**: 339-48, bibl. 4, illus.

The symptoms are described of a new internal stem rot caused by a *Fomes* sp., which has been observed sporadically in robusta plantations in the Congo. Infected trees should be cut back below the lesion, the wound being treated with 5% vegetable tar. The tar can also be used to protect healthy trees.

1150. Orlando, A., and Ribeiro, B. L.
Ensayos preliminares de contrôle à lagarta gelatinosa dos cafezais, por meio de polvilhamentos. (**Preliminary investigations on the control of *Dalcera abrasa* on coffee by dusting.**)
Biológico, 1955, **21**: 140-6, bibl. 3, illus.

Of 12 dusts tested against *Dalcera abrasa* on detached coffee leaves 1·5% BHC and 5% malathion gave the best results, namely 100 and 95% mortality respectively.—Inst. biol., São Paulo.

1151. Willet, J. R.
Verwerking van een enquête betreffende ziekten en plagen in de koffiecultuur. (**Results of an inquiry concerning pests and diseases of coffee growing.**) [English and Indonesian summaries 13 and 15 lines respectively.]
Bergcultures, 1955, **24**: 387-93.

From the replies to a questionnaire sent to estates in East Java it is clear that mealy bug is the main pest in this area. Coffee berry borer causes considerable damage on many estates. Other pests and diseases are of local importance. Chemical control is seldom used, and the costs of pest and disease control are low. It is concluded that modern control methods would prove advantageous.—Besoekisch Proefst., Djember.

Mangoes

1152. Orr, K. J., and Miller, C. D.
Description and quality of some mango varieties grown in Hawaii and their suitability for freezing.
Tech. Bull. Hawaii agric. Exp. Stat. **26**, 1955, pp. 24, bibl. 2.

The authors describe 21 Hawaian varieties of mango and give some of their physical and chemical characteristics. Freezing studies were carried out for 2 seasons, but only 2 varieties, Joe Welch and Fairchild, were classed as satisfactory in both seasons. No variety was ideal.

1153. Kandiah, S.
Deficiency disease of mango.
A.R. Ceylon Dir. Agric. 1954, 1955, p. 49.

Among various treatments dolomitic limestone gave the best control of a disorder characterized by leaf scorch and dieback and associated with a deficiency of Mg and, to a lesser extent, of Ca in the affected leaves.

1154. Spencer, J. L., and Kennard, W. C.
Studies on mango (*Mangifera indica* L.) fruit set in Puerto Rico.
Trop. Agriculture Trin., 1955, **32**: 323-30, bibl. 9.

Studies on 15 varieties suggest that the most important factors contributing to low fruit set in mangoes in Puerto Rico are ineffective pollination due to a lack of transferring agents, the limited period of stigmatic receptivity and the maturation of the stigmas before the anthers. Other factors are the failure of the gynoecia to develop properly, thrips damage and reductions in the viability of the small quantity of pollen produced by low humidity, high temperature and bright sunlight. —Agric. Res. Serv., Fed. Exp. Stat., Mayagüez.

1155. Wahhab, A., and Khan, A. J.
Changes in the chemical composition of mangoes during ripening.
Pakistan J. Sci., 1954, **6**: 124-7, from abstr. in *Trop. Abstr.*, 1955, Vol. **10**, No. c2504.

Two varieties of mango, Langra and Ghulab Khas, were analysed at weekly intervals up to maturity. The results show that the former variety is far superior to the latter in quality and food value.

Oil palms.

(*See also* 1263.)

1156. Pronk, F.
Oliepalm: productie-verwachtingen van het Deli tenera type. **(Oil palms: production expected from the Deli tenera type.)** [English and Indonesian summaries 7 and 8 lines respectively.]
Bergcultures, 1955, **24**: 379-81, also issued in English as *Circ. algemeen Proef. A.V.R.O.S.* **220**, *Oliepalmserie* **7**, 1955, pp. 4 stencilled.

In the early stages of several trials Deli tenera types of oil palm, originating from crosses between imported tenera and Deli dura or between Deli dura × pisifera, have equalled Deli dura palms in bunch production and have produced superior fruit averaging 20–25% more oil.—Algemeen Proefst. A.V.R.O.S., Medan.

1157. Hartley, C. W. S.
Oil palm establishment problems in British West Africa.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

The problems discussed are mainly connected with climate, which affects germination, and planting in the nursery and in the field.—W.A.I.F.O.R., Benin, Nigeria.

1158. Anon.
Palmier à huile et plantes vivrières. **(Interplanting oil palms with food crops.)**
Bull. Inf. INEAC, 1955, **4**: 319-23.

Six intercropping treatments have been compared in experiments lasting 15 years. Palm yields from each of the intercropping treatments were higher than those of the control. The highest average annual increases compared with the control were 17% with a 2-year cassava/cassava plus maize rotation and 18% with a 2-year rice/groundnut/rice/groundnut rotation. Successive banana crops led to an average annual increase of 13%, but bananas rotated with rice or cassava did not give such good results.

1159. Prevot, P., and Ollagnier, M.
Diagnostic foliaire et fumures minérales dans les régions tropicales. **(The use of leaf analysis and fertilizers in the tropics.)**
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.

The authors discuss the successful application of various leaf analysis methods to determine the manurial requirements of groundnuts and oil palms in the Congo and Senegal. [See also *H.A.*, 24: 3177 and 25: 3301.]—Inst. Rech. Huiles Oléag., Paris.

1160. Prevot, P.
Fumure potassique au Dahomey. **(Potash manuring in Dahomey.)**
Oléagineux, 1955, **10**: 593-7, bibl. 9.

Investigations by the Institut de Recherches pour les Huiles et Oléagineux in oil palm areas have shown that (1) K gives large yield increases, (2) annual applications of K for 9 years, the duration of the experiment to date, has not yet upset the mineral balance, (3) the residual effect of K fertilizer lasts about 3 years, and (4) severe K deficiency exists in the natural palm groves.

1161. Somade, B.
Moisture equilibrium of palm kernels.
J. Sci. Food Agric., 1955, **6**: 425-7, bibl. 1.

Determinations have been made of the moisture content of whole palm kernels kept for times up to 35 days in desiccators over saturated salt solutions for which the relative humidities at 30° are known.—[From author's summary.]—W. Afr. Stored Prod. Res. Unit, Nigeria.

1162. Palmer, K. N.
Spontaneous heating and ignition in stored palm kernels—the role of anaerobic fermentation.
J. Sci. Food Agric., 1955, **6**: 495-501, bibl. 9.

The rate of absorption of oxygen by moist palm kernels, which had previously fermented under anaerobic conditions, has been studied. No evidence was found of the formation of reactive fermentation products able to absorb oxygen rapidly and heat the kernels, thus leading to spontaneous ignition. It is concluded that the spontaneous ignition of palm kernels in jute bags is less likely than was originally believed [see *H.A.*, 21: 3030], and that the observed outbreaks of fire in these materials may have been due to other causes. [Author's abstract.]—Fire Res. Stat., Boreham Wood, Herts.

Papaws.

(*See also* 1235d.)

1163. Stadler, L. B.
An assay method for papain using a synthetic substrate.
Diss Abstr., 1955, **15**: 714-15, being *Publ.* 11359 of 120 pp.

Papain was successfully assayed by allowing it to act on hippuryl amide and measuring the liberated ammonia by the use of Nessler reagent. This method gave more precise results and covered a wider range of types of papain preparations than the beef assay method.—Univ. Mich.

Pineapples.

(*See also* 1202.)

1164. Jackson, T. H.
Pineapples.
A.R. Kenya Dep. Agric. 1953, Vol. II, 1955, pp. 108-13.

In a manurial-soil fumigation trial in Central Province on old pineapple land replanted in pineapples, 4 split applications of ammonium sulphate totalling 2,000 lb. per acre increased the plant crop yield from 8·1 to 12 tons, number of fruit from 5282 to 6687 per acre and average fruit weight by 0·76 lb. Post-planting fumigation with EDB reduced yield by 2 tons and 1180 fruits per acre, but the decreases were less in the presence of Fe applied 6 times as 2% sulphate sprays. Fe plus N increased the percentage of fruits of 4 lb. and over (the ideal canning size) from 17 to 50, and the percentage of fruits harvested between March and May from 20 to 28.

1165. Sideris, C. P.
Interdependence of iron and nitrogen in pineapple chlorosis.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxii-xxxiii.

Pineapple plants were grown in a complete nutrient solution culture for 7 months, and then grown for 5 months in complete, or in N-deficient or Fe-deficient, solutions. Results indicated that leaves from plants grown in complete solutions were uniformly green and contained much more chlorophyll and protein than those in deficient solutions. In the N-deficient cultures, the mature and young leaves were chlorotic and contained lower chlorophyll and protein-N concentrations than in Fe-deficient solutions. In Fe-deficient cultures only the young leaves were chlorotic and contained low chlorophyll and protein-N concentrations.—Pineapple Res. Inst. of Hawaii, Honolulu.

1166. Py, C.
Les hormones dans la culture de l'ananas. **(Growth substances in pineapple growing.)**
Ann. Inst. Fruits Agrumes colon. **6**, 1953, pp. 46, bibl. 29, illus.

Following an account of experiments in French Guinea [see *H.A.* 24: 3182] and elsewhere on treating pineapples with growth substances to induce flowering, practical recommendations are made as follows. *Acetylene.* 110–120 g. calcium carbide is added to some 30 l. water, and 50 c.c. of this solution is applied to the centre of the rosette of leaves on each plant on 2-3 successive days when the leaves are dry. *NAA.* Each plant is sprayed once with 50 c.c. of NAA at concentrations of 3, 5 or 10 p.p.m. depending on the weather. *2,4-D.* The method recommended is similar to that described for NAA, the concentration being 10 p.p.m. *Date of treatment.* To obtain fruit in December/February second-year plants must be treated in June/August, and at this season only acetylene is recommended. To get fruit in March/May treatment must be applied in September/November, which in the case of the variety Baronne de Rothschild is 2–2½ months before natural inflorescence differentiation; uniform stands should be treated with NAA or 2,4-D and less even stands with acetylene. *Interval between treatment and harvesting.* For acetylene the interval is 7 weeks between treatment and the appearance of the inflorescence plus 4 months to complete development of large fruit. For NAA the figures are 8 weeks and 5 months. *Weight of anticipated harvest.* A close correlation exists between leaf number and fruit weight. In Baronne de Rothschild approximately 35 functional leaves are needed to produce a fruit of 1·5 kg., and a variation of 10 leaves results in a difference of 0·5 kg. in fruit weight. A short note is also given on the use of NAA after inflorescence differentiation to control fruiting.

1167. Py, C.
Variation, chez l'ananas, de l'écart de temps qui sépare le traitement destiné à provoquer la floraison de la récolte. **(Variation in the interval between the treatment of pineapples to induce flowering and harvesting.)**
Rev. agric. Réunion, 1955, **55**: 85-8.

The period between treatment of the leaf rosettes and fruit maturation averages 180 days with acetylene solution and 187 days with NAA. Factors which may modify the period are: (1) The larger the fruit the shorter the interval. (2) With acetylene the interval may be 10 days shorter than normal when the weather is warm and wet and rather longer than normal when it is dry or cold (below 15° C.). (3) High N without K results in a longer period than does a balanced fertilizer. (5) The interval between treatment with NAA and the appearance of the flower depends on the rate of application and ranges from about 49 days with 0·1 mg. to 54 days with 0·4 mg. If NAA is applied between flowering and harvesting to improve yield the greater the amount applied the longer is the maturation period. Any factor which delays maturation after fruit formation favours cracking in December/February, but cracking can be minimized by keeping the interval between treatment and harvesting as short as possible and by covering the fruit with straw.—I.F.A.C., Kindia, French Guinea.

1168. Py, C.
Influence de la fumure sur la réponse de l'ananas à un traitement à l'acétylène. **(The effect of manuring on the response of pineapples to acetylene treatment.)**
Rev. agric. Réunion, 1955, **55**: 88-91.

By stimulating vegetative development N reduces the response of pineapples to acetylene treatment for flower induction. The smaller the amount of N applied and the longer the interval between its application and acetylene treatment, the less is the response to acetylene affected. It is recommended that only plants which have received no N for 3 months should be treated, and that, to prevent early natural flowering, N should be applied about a month before natural differentiation of inflorescences is expected to begin.—I.F.A.C., Kindia, French Guinea.

1169. Anon.
Induced out-of-season fruiting in pineapples.
Suppl. A.R. Zanzibar Dep. Agric. 1954, 1955, p. 7.

Current experiments suggest that well-grown pineapples can be induced to fruit in mid-August, 2½–5½ months earlier than normal, by applying 2–4 oz. 10 p.p.m. α-NAA to each crown in mid-February, but that there is nothing to be gained by treating the plants less than 7–8 months before the normal harvesting season.

1170. Fernando, H. E.
Pineapple wilt and mealybug control.
A.R.Ceylon Dir. Agric. 1954, 1955, p. 53.

A trial using organophosphorus insecticides was conducted at Kandana on a plantation which showed incipient wilt symptoms and extensive mealy bug infestation. Where the bases of the plants were cleaned prior to spraying, complete control of mealy bugs on the aerial parts of the plant, but not of root colonies, was achieved with emulsions of malathion, diazinon or parathion. In laboratory tests suckers dipped in the same compounds were completely freed of mealy bugs within 24 hours.

1171. Leiderman, L., and Vasconcellos, F.T.C.
Combate à resinose do abacaxi com modernos inseticidas orgânicos. **(Control of gumming in pineapples with modern organic insecticides.)**
Biológico, 1955, **21**: 97-103, bibl. 6, illus.

In 1954/55 12 insecticides in the form of wettable powders, emulsifiable concentrates and dusts were compared against the caterpillars of *Thecla basilides.* The best in each category were 0·04% lindane wettable powder, 0·06% aldrin emulsifiable concentrate and 10% DDT dust which resulted in 4·2, 5·3 and 2·5% attacked fruit, respectively, compared with 53, 31 and 44%, respectively, in the controls. Applications were made fortnightly in August/November during flowering and fruit maturation.

1172. Py, C.
Étude du prix de revient de l'emballage des ananas. **(A study of pineapple packing costs.)**
Fruits d'Outre Mer, 1955, **10**: 389-94, illus.

Details are given for IFAC-branded pineapples exported from French Guinea in the 1954-55 season. Reinforced plywood boxes were cheaper than deal. The costs of 6- and 8-fruit plywood boxes are compared.

1173. N, E.
Transport d'ananas par la U.A.T. **(Pineapple transport by the U.A.T.)**
Fruits d'Outre Mer, 1955, **10**: 447.

A brief note is given on a successful trial on transporting pineapples loose in aircraft from the Ivory Coast to France. The fruits are harvested when mature and brushed, the crowns and stems being disinfected. They are then immediately packed separately in wood fibre and rolled in kraft paper which is tied twice with string. The ends of the package are left open and project slightly beyond crown and stem. Nets keep the stacks of fruit in position in the aircraft.

Rubber trees.

(*See also* 851, 1234a, e, f, i, n, z, 1235m, q, w.)

1174. I.R.C.I.
Institut des Recherches sur le Caoutchouc en Indochine. Rapport annuel 1954. **(Annual Report of the Institute for Research on Rubber in Indo-China for 1954),** 1955, pp. 213.

Selection. PR. 107 is the most outstanding clone so far tested and PB. 86 and AVROS 427 have also given good performances. The most promising local selections are OY. 1, IRCI. 6, IRCI. 7 and IRCI. 10. *Breeding.* The highest-yielding mother trees of the IRCI series are IRCI. 6 and IRCI. 7. Results with legitimate, near-legitimate and illegitimate families are also given. [For other aspects of work see several abstracts below.]

1175. Evers, E.
Description de trois clones primaires d'hévéa choisis à Yangambi. **(Description of the three primary hevea clones selected at Yangambi.)**
Bull. Inf. INEAC, 1955, **4**: 239-58, illus.

The botanical and latex characters of the clones Y3/46, Y22/44 and Y284/69 are given in detail.

1176. Wiersum, L. K.
Experiences in rooting hevea cuttings.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Rooting capacity is found to be correlated with juvenility. The best rooting was got with the shoot tips and cuttings from the stem base of intact seedlings. Generally the presence of foliage on the cutting is advantageous and also the fact that the stem is flushing. There are indications of individual, viz. genetical, variations in rooting capacity.—Exp. Stat. C.P.V. Bogor, Indonesia.

1177. Campaignolle, J., and Bouthillon, J.
Alliance clone-sujet. **(Clone-stock relationship.)**
A.R. Inst. Rech. Caoutch. Indochine 1954, 1955, pp. 66-80.

Effect of crown on the tapped stock. Experiments suggest that the effect of the crown extends far below the union. If the tapping panel does not extend more than 20–30 cm. below the union, its production is as high as that of the scion. Although in practice the panel is much longer than this, its production remains higher than that which would be obtained at the same height in a base-grafted tree. *Effect of stock on scion.* A slight effect exists.

1178. Campaignolle, J., and Bouthillon, J.
La sélection précoce. **(Pre-selection.)**
A.R. Inst. Rech. Caoutch Indochine 1954, 1955, pp. 165-75.

A germination test suggests the possibility of preliminary pre-selection based on the rate of growth of young seedlings. An account is given of nursery and field tests which led to the following conclusions: (1) Field selection is preferable to nursery selection because pre-selected plants—the largest in the nursery—are those which would suffer most in transplantation. (2) The basic principle in field selection is to begin with a large number of plants so that the rate of elimination is high. (3) The best criterion for pre-selection is size as it is simple and causes no injury. (4) There is a very close correlation between size and yield, but this is not due solely to the greater length of cut; large trees yield more per cm. of cut than do smaller ones.

1179. Evers, E.
Quelques éléments de la phytotechnie de l'hévéa. (Dispositif et densité de plantation —Eclairie.) **(Some aspects of rubber culture. Plantation layout and density. Thinning.)**
Bull. Inf. INEAC, 1955, **4**: 287-301, bibl. 2.

Layout. A comparison is made of the costs of clearing and maintaining lines and interlines, the incidence of diseases and the economics of production in (1) hedge-planting at 10 × 2 m., (2) equidistant-line planting at 5 × 4 m. or 7 × 2·8 m., and (3) double-line planting at 11 and 3 × 2·8 m. It is concluded that the equidistant-line layout gives the highest yield per ha. at the lowest cost. *Initial density.* Too high a density reduces vigour, yield and the period of high production. The initial density should be high enough to allow for losses among trees in the early stages and to encourage earliest and highest possible production from mature trees, the last necessitating heavy selective thinning on the basis of vigour and productivity, but should not exceed the limit beyond which any increase in yield fails to cover the increased cost. *Thinning.* A thinning programme is presented for equidistant-line planting. It involves the gradual reduction of the initial stand of 6640 trees per ha to 275 after 10 years. Poisoning with sodium arsenite is recommended as the best means of thinning. [See also *H.A.* 24: 4358.]

1180. Constable, D. H.
Growth and growth measurements as an aid to manurial diagnosis in tropical horticulture.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Chemical analyses have been made on samples of all tissues of hevea trees aged 1-7 years. Trees of ages up to 15 have been uprooted, weighed and submitted to girth measurement. There are long-term records of average girth at different ages. A linear relationship has been established between girth and age and between log weight and log girth. The analysis of these relationships makes possible the determination of the yearly increment of nutrient uptake, optimum yearly growth, and future probable nutrient uptake for any given average tree size. A further calculation on the comparative lack of soil fertility permits determination of maximum manurial rates and levels for experimental testing.—Rubb. Res. Inst., Dartonfield, Agalawatta, Ceylon.

1181. Constable, D. H.
Manurial diagnosis for *Hevea brasiliensis*. A progress report of the Agronomy Department for 1951-1954. Part II. Laboratory work.
Bull Rubb. Res. Inst. Ceylon **56**, 1955, pp. bibl. 27.

Foliar analysis was the method selected and sampling methods and laboratory techniques are discussed. It was found that: (1) K values were a satisfactory reflection of uptake and that sufficiency and deficiency levels could be established; (2) N could be characterized as to sufficiency and deficiency levels, but there was a wide, vague, intermediate zone which has so far prevented the establishment of optimum manurial levels; and (3) P gave indefinite results. Ca, Mg, Fe and Mn are also discussed. Data are presented for various areas. [For part I see *H.A.*, 25: 3315.]

1182. Beaufils, E. R.
Diagnostic minéral—Expériences d'engrais. **(Mineral analysis and manurial experiments.)**
A.R. Inst. Rech. Caoutch. Indochine 1954, 1955, pp. 132-64.

Mineral analysis. The principal mineral relationships recognized at present are N/P, N/K and K/P in both leaf and latex, K/Ca and Mn/Cu in the leaf only and Mg/P in the latex. The positions of Na and S have been determined in 1954, and both are shown in the latest diagram illustrating the system of balance between the mineral elements in the leaf. *Manurial experiments.* The first practical experiments based on mineral analysis were made in 1954 and led to the following conclusions: (1) The assimilation of elements applied to the soil is very rapid and occurs within 1–4 months of broadcasting. (2) Requirements vary during the year. NPK requirements are highest during refoliation and the rate of assimilation of these elements at this period governs production during the ensuing months. Ca requirements increase during the transport of NPK as Ca is a regulating factor in protein synthesis. NPK should be applied between mid-November and mid-February, and Ca at the beginning of May. Fractional applications are better than a single one. (3) Tricalcium phosphate is not recommended for the control of P deficiency. (4) Copper sulphate can be added with advantage to NPK fertilizers, but not to a Ca fertilizer in cases of Ca deficiency. (5) The hypothesis that Ca can be an important factor in limiting production is confirmed. [For previous report see *H.A.*, 25: 1065.]

1183. van Schoonneveldt, J. C.
Groei en bemesting van jonge hevea in Besuki. II. Stand van zaken na vier jaren veldproevenonderzoek. **(Growth and manuring of young hevea in Besuki. II. The situation after 4 years of field trials.)** [English and Indonesian summaries 14 and 15 lines respectively.]
Bergcultures, 1955, **24**: 407-13.

A further report is given of 3 of the manurial trials in Besuki [for an earlier report see *H.A.*, 25: 3314]. In all 3 trials nitrogen applications gave a significant increase in growth and corrected N-deficiency symptoms. There has been no apparent response to phosphate or potash.

1184. Bolle-Jones, E. W.
Comparative effects of ammonium and nitrate ions on the growth and composition of *Hevea brasiliensis*.
Physiol. Plant., 1955, **8**: 606-29, bib. 32, illus.

Seedlings of *Hevea brasiliensis* were grown in sand culture and were supplied with varying ratios of ammonium and nitrate nitrogen and a very low or normal level of calcium. The plants tolerated a high level of ammonium supply and the low level of calcium without any serious or permanent visual indication of malnutrition. Ammonium or nitrate addition exercised a similar positive effect on dry weight of plant and on the concentrations in the laminae of chlorophyll, ammonia-, nitrate-, amide-, free amino-acid and total-, nitrogen, and similar negative effects on the laminar concentrations of phosphorus and potassium. For the chlorophyll, ammonia-, nitrate-, amide-, free amino- and total-, nitrogen and potassium concentrations the overall response to ammonium was more marked than to nitrate. Ammonium and nitrate exerted differential effects on the magnesium and calcium concentrations of the laminae and on the pH of the medium surrounding the roots. Ammonium addition decreased the magnesium and calcium laminar concentrations and of the (leachate) pH, while nitrate addition increased the laminar concentration of magnesium for the low calcium plants, the laminar concentration of calcium for the high calcium plants and the (leachate) pH. The inclusion of ammonium salts as a source of nitrogen supply decreased the requirement for calcium and did not always increase the stem girth measurement of the plants as nitrate addition invariably did. As the potassium and phosphorus concentrations of the laminae decreased, the free amino-acid nitrogen present increased. A similar increase was obtained for a decreased laminar concentration of calcium but only when that decrease was caused by extra ammonium supply. Increased calcium supply decreased the chlorophyll and amide-nitrogen concentrations within the laminae but increased that of ammonia-nitrogen at the lower levels of ammonium supply. The ability of *Hevea brasiliensis* to withstand extremely low pH values and relatively high ammonium concentrations, and the requirement for a very small supply of calcium, may be a partial explanation of the successful cultivation of the crop under tropical,, strongly acid, soil conditions.—[Author's summary.]—Rubber Res. Inst. Malaya.

1185. CAMPAIGNOLLE, J., AND BOUTHILLON, J.
Experiénces de saignée. **(Tapping trials.)**
A.R. Inst. Rech. Caoutch. Indochine 1954, 1955, pp. 81-115.

Age of tree. In an experiment in which trees were first subjected to 6-monthly tapping between the ages of 7 and 9 years, growth was considerably retarded by the opening of the panel, and it is thought that those first tapped at 9 years will give the best production. *Tapping intensity.* Intensive initial tapping of poorly developed and closely spaced trees adversely affected their future yield. *Tapping system.* A comparison of 3S/2. d/4. d/4 with S/1. d/3. d/4 and 2S/2. d/3. d/4 showed that with high-yielding material increasing the tapping intensity from 114 to 150% gave a considerable increase in production. A comparison of d/3. d/3 with d/3. d/4 and d/4. d/4, using whole spiral tapping in each case, also suggested that intensification is followed by a proportional yield increase, but it remains to be seen whether this yield increase will be maintained and whether S/1. d/3. d/3, which represents an intensity of 133%, will exhaust the trees. It is thought that only high-yielding trees can sustain this intensity permanently but that temporary increases to it are safe for lower-yielding material. *Tapping technique.* Experiments on PR. 107 show that bark consumption can be reduced to 0·6 mm. per cut without loss of yield. Experiments with multiple panels are also in progress.

1186. CAMPAIGNOLLE, J., AND BOUTHILLON, J.
La stimulation. **(Yield stimulation.)**
A.R. Inst. Rech. Caoutch. Indochine 1954, 1955, pp. 176-98.

Minor element injections. In a semi-commercial experiment to determine whether copper sulphate injections can be given successfully for several years in succession the value of the 5th annual injection is doubtful. On the other hand, in a quarterly injection experiment the 9th and 10th injections have given substantial increases. In a semi-commercial experiment on 6 clones to study the incidence of necrosis as a result of copper injections no signs of bark injury were observed after 5 months. In a current experiment with boric acid the first injection gave a yield increase of 21% and caused no necrosis. *Painting with growth substances.* In a new semi-commercial experiment 2,4-D plus a small amount of copper sulphate gave yield increases during the first 2 months ranging from 9% with Tj.1 to 88% with PB. 86. In an exploratory experiment combining Stimulex painting with copper sulphate injection gave a significant increase in the first year compared with either compound used alone. Recommendations for growth substance treatment are: (1) Avoid treatment during the dry season; (2) avoid deep, irregular scraping; and (3) do not paint the bark on a band exceeding 3 months' bark consumption.

1187. GYSS, P.
La clarification du latex. **(Latex clarification.)** [French and English.]
Rev. gén. Caoutch., 1955, **32**: 623-7 (French) and 640-4 (English), bibl. 5.

The latices of Tj.1, Tj.16, PB.186 and Gl.1 were used in laboratory-scale studies on the effects of centrifugal clarification on the chemical composition of latex. Clarification (1) reduced the acetone extract and N and P contents of the latices, but the effect of clarification on the constituents of the rubber formed after coagulation was slight; (2) partly removed Mg which may affect the mechanical stability of the concentrate; (3) reduced the Cu content; and (4) generally reduced the diurnal variation in a given clone. It is concluded that, in general, centrifugal clarification resulted in a definite improvement in the properties and uniformity of latex.—Socfin Co., Kuala-Lumpur, Malaya.

1188. YOUNG, H. E.
Bark rot and canker of the rubber tree.
Adv. Circ. Rubb. Res. Inst., Ceylon **54**, pp. 8,

Information is given on seasonal incidence, symptoms and damage, mode of infection, and preventive and curative treatment of black stripe (*Phytophthora palmivora*) and coloured canker caused by *Pythium complectens* often in association with *P. palmivora*. [This circular supersedes No. 21.]

1189. COLES, G. V., MARTIN, J. T., AND BYRDE, R.J.W.
The fungicidal properties of coal tar distillates: progress report II.
A.R. Long Ashton agric. hort. Res. Stat. for 1954, 1955, pp. 74-82, bibl. 4.

The first report [*H.A.*, 25; 1068] described investigations on the fungicidal efficiencies of components of coal tar distillates against *Ceratostomella fimbriata*, the fungus responsible for mouldy rot infection of newly-tapped bark of rubber trees. In this progress report a method of analysis of tar oil fungicides is described. Phenols, bases and neutral oil are determined after the separation of water and formulating solids. The fungicidal efficiencies against *Ceratostomella fimbriata* of proprietary tar oil fungicides and of constituent fractions have been assessed by a laboratory method of bioassay. The results of bioassay have been correlated with those of chemical analysis. The predominating effect of the phenols in determining the efficiency of the fungicides has been confirmed. No evidence has been detected of a synergistic effect between the phenols and the neutral oil. [Authors' summary.]

1190. ANON.
Slugs and snails.
Plant. Bull. R.R.I.M., 1955, No. 21, pp. 107-9, illus.

The snails and slugs damaging young rubber trees are described. Notes are given on the preparation of 'metabar' bricks for their control. They are composed of 1 part by weight of 'meta', 6 lime, 6 cement and 2 rice bran and their dimensions are 2 in. × 1 in. × 1 in. They are not as attractive as ordinary poison bran mash, which should therefore be used first to reduce the population quickly in cases of severe infestation, but they remain effective for many weeks when exposed to rain and sun.

Sugar cane.

(*See also* 8, 1234c, j, m, o, 1235f, p.)

1191. CALMAN, W. M.
International sugar situation.
Quart. Rev. agric. Econ., 1955, **8**: 120-6.

World production, consumption, imports, exports and prices are discussed as a guide to Australian sugar producers. The author concludes that, although the non-adherence of Brazil to the International Sugar Agreement, the possible lowering of prices due to the improved international situation and the high world production in 1954/55 may jeopardize the stability of the market, beyond the period of the present Agreement which expires on January 1, 1959, there are good grounds for expecting a substantial increase in the world demand for sugar. There is, however, no reason to doubt that the world's producers will be more than capable of meeting this increased demand, and the main problem appears likely to remain the historical one of restricting production in order that supplies do not outstrip demand.

1192. Parthasarathy, S. V.
Sugarcane in Madras State.
Madras agric. J., 1955, **42**: 3-13, bibl. 34.

Information is given on varieties, yields, manuring, irrigation, maintenance, pests, diseases and studies on the clarification of gur, and on factors affecting its quality.

1193. Barbados.
20th A.R.B.W.I. Centr. Sugar Cane Breed. Stat. Barbados, for the year ending September 30th, 1953, pp. 68.

Plant canes. Of the B.49 series only B.49311 appeared to have commercial possibilities. *First ratoons.* None of the B.48 series appeared to have commercial possibilities. *Second ratoons.* B.4738 performed exceptionally well, especially in low and intermediate rainfall areas. B.4744 gave heavy yields in high rainfall areas. Other promising canes are B.47258, B.47380 and B.47419. *Third ratoons.* In the high rainfall area B.45151 was outstanding and B.41211 (which now includes B.46223 and B.46397) also gave heavy yields. *Select seedling trials.* In plant cane trials B.4744 gave the heaviest yields in the high rainfall and valley soil areas and B.47419 and B.45151 also yielded well in the high rainfall areas. In first ratoon trials B.41211 surpassed B.37161 and B.4098 in the low rainfall areas. *Performance of varieties in contributing colonies* is also reported.

1194. Birkett, L. S., Cameron, C., and Paul, H.
Field experiments with sugar cane. XXIII.
Sugar Bull. Brit. Guiana Dep. Agric. **23**, 1955, pp. 1-52, bibl. 3.

Seventy variety trials made in 1954 are described, a performance summary is given and recommendations are made concerning varietal representation on different soils. B.41227 is equal to B.37161 under conditions of heavy rainfall provided drainage conditions are satisfactory. Both these varieties are recommended for extensive planting. Other varieties recommended for limited planting are B.4098, D.37/45, B.4362, B.4373, B.46378, B.43413 and B.45137. Accounts are also given of one cultural and 9 fertilizer trials.

1195. Collings-Wells, L. J.
Sugar cane variety (Expt. 29/2).
A.R.Kenya Dep. Agric. 1953, Vol. II, 1955, pp. 199-201.

In a variety trial at Miwani in Nyanze Province Co.421 (Miwani) and Co. 421 (Amani) significantly outyielded the other 3 varieties in the first ratoon, giving 31·27 and 31·14 tons cane per acre respectively. In a trial of 8 varieties at Kakamega Co.421 and B.3337 gave the highest plant cane yields, viz. 67 and 56 tons cane per acre respectively

1196. Singh, Harbans., Singh, Hardial., and Singh, M.
Co. L.29 has better qualities to offer.
Indian Fmg, 1955, **5**(7):37.

Evolved at Lyallpur, the new variety outyields Co.313, the standard early variety in the Punjab, in both plant and ratoon crops.

1197. Wang, C. C.
Comparative studies on the planting and ratooning of the sugarcane varieties in Taiwan. [Chinese, with English summary 2¼ pp.]
J. agric. Ass. China, 1955, **10**: 30-68.

Tests were made on 80 varieties at Taiching and Taipeh during the period 1947/54. The results were: (1) Setts obtained from upland nurseries showed better germination rates than those from lowland nurseries. (2) Mosaic and *Cytospora* sheath rot were less serious in upland setts. (3) Setts and ratoons of early varieties showed better germination rates and yields than did those of medium or late varieties. (4) In early and medium varieties ratoons produced a significantly greater number of millable stalks than did plant cane. (5) Length and weight of stalks and number of tillers per stool were positively correlated, and thickness of stalks, number of nodes per stalk and Brix of juice were negatively correlated with yields of millable stalks of plant and ratoon canes. When these results are considered in conjunction with susceptibility to *Stagonospora* leaf scorch, rate of arrowing and juice concentration only 2 varieties can be recommended for further planting, namely N:Co.310 and F.134—Nat. Taiwan Univ., Taipeh.

1198. Hall, W. C., and Khan, M. A.
Influence of temperature and daylength on growth and sugar content of sugar cane following auxin treatment of cuttings.
Bot. Gaz., 1955, **116**: 274-81, bibl. 9, illus.

Stem cuttings of C.P. 36/13 were treated by soaking in aqueous solutions of indoleacetic acid, indolebutyric acid, sodium naphthaleneacetate, and the amine salt of alpha-ortho-chlorophenoxypropionic acid. Different concentrations and combinations of auxins were employed. The effects of treatment on the growth and sugar content of plants were correlated with temperature and supplementary illumination during their development to maturity. Under normal conditions auxin treatment increased the height of the main axis, stimulated tillering and increased sucrose, but decreased reducing sugars. The number of green leaves produced was not significantly different in treated and untreated plants. The rate of stem elongation and tillering increased rapidly as the seasonal temperatures increased, especially tillering in auxin-treated plants. Plants produced from auxin-treated cuttings and exposed to 4 hours of additional illumination daily were taller, developed more leaves and contained more reducing sugars, but produced fewer tillers and less sucrose than did similarly treated plants kept under natural-day conditions. [From authors' summary.]—A. and M. Coll. Texas, College Station.

1199. Ashton, F. M.
The effects of alternating cycles of low and high soil water content on the rate of photosynthesis.
From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xvii.

The effects of several alternating cycles of high and low soil water content on the rate of photosynthesis were studied with entire sugar cane plants. Two effects were observed: (1) A change in the rate of photosynthesis on the day of irrigation following a dry period; this increased each cycle for the first 4 cycles; and (2) a change in the rate of photosynthesis on the day preceding the day of irrigation; this progressively increased throughout the experiment. A high rate of photosynthesis was maintained until the soil approached its permanent wilting percentage, and a rather slow recovery followed irrigation.—Exp. Stat., H.S.P.A., Honolulu.

1200. Smith, N. M.
Soil conditioner trials at Bundaberg.
Cane Grs' quart. Bull., 1955, **19**: 41.

The results of three trials with krilium at 400 lb. per acre appeared to indicate that (1) the top treated portion of the soil must be retained in that position; (2) the effects on clayey soils were quickly lost by cane cultural methods; (3) sandy forest lands are not responsive to treatment; and (4) temporary benefits, where obtained, were far outweighed by the cost of material. [From author's conclusions.]

1201. Vallance, L. G.
The economic use of fertilizers.
Cane Grs' quart. Bull., 1955, **19**: 44-5.

Investigations on the use of filter mud as a manure conducted at Mackay since 1946 have shown that (1) it supplies N, P and K, but is not a better proposition than commercial fertilizer on soils of reasonably good tilth; (2) it has its most useful application on irrigated properties because moisture is sufficient throughout the year to make its plant food content steadily available; and (3) it improves the physical condition of poor soils when applied at 80-100 tons per acre.

1202. Samuels, G., and Landrau, P., Jr.
Filter-press cake as a fertilizer.
Sugar J., 1955, **18**(5): 30-4, bibl. 9.

Experiments in Puerto Rico showed that filter-press cake is a suitable fertilizer for certain crops. Its main advantages and disadvantages are listed and recommendations are made for its use at 10–20 tons per acre on sugar cane, pineapples, coffee, tobacco, tomatoes, sweet peppers, plantains and other crops.

1203. Evans, H.
Studies in the mineral nutrition of sugar cane in British Guiana. II. The mineral status of sugar cane as revealed by foliar analysis.
Trop. Agriculture Trin., 1955, **32**: 295-322, bibl. 63.

Studies on the use of foliar analysis as an aid in diagnosing the nutritional status of sugar cane in British Guiana has given the following results: the minimum N content of the leaf corresponding with maximum sugar yield per acre in plant cane was 2·5, 2·2–2·3 and 2·0–2·1% at 3, 4½ and 6 months respectively. For K, P which was affected by rainfall, Ca and Mg the corresponding figures did not vary with age; they were 1·2, 0·21, 0·17–0·18 and 0·08–0·10% respectively. For micronutrients the minimum contents required and the contents actually found were, in p.p.m.: Mn 40 and 100–400, Fe 15–20 and 40–250, Cu 4·0 and 4·0–14·0, Zn about 15 and 20–60, B 5 and 4–40 (occasional inadequacy especially during wet periods), Mo 0·04–0·08 and 0·04–0·40 (occasional inadequacy).—Bookers Sugar Estates, Georgetown, B.G. [For Part I see *H.A.*, 25: 3328.]

1204. Locsin, C. L., and Guillermo, R. J.
The fertilizing effects of various forms of phosphorus compounds on sugar cane grown in the Victorias-Manapla-Cadiz district.
J. Soil Sci. Soc. Philipp., 1955, 7(1), reprinted in *Sugar News*, 1955, **31**: 277-86, bibl. 6.

In experiments in 1949/54 water-soluble, citrate-soluble and water-insoluble phosphorus fertilizers were compared on plant and ratoon crops of 5 varieties on ferruginous, acid soils of the Victorias milling area. Generally, the citrate-soluble and water-insoluble phosphates compared fairly well with the water-soluble compounds under conditions obtaining in the tests. Most of the experimental fields had very acid soils, a condition that might have increased the availability of the phosphorus of the former group and which also lessened that of the latter group. Significantly higher cane and sugar yields from plots treated with two water-soluble phosphates were obtained in two experiments on soils of moderate acidity and low available phosphorus.

1205. Lal, K. N., and Tandon, J. N.
Effect of S/Se and Ca/B ratios on growth sap characteristics of sugarcane.
Curr. Sci., 1955, **24**: 314-15, bibl. 6.

The variety Co. 453 was grown in a sandy loam soil supplied with a basic dressing of NPK and varying proportions of sulphur and selenium and calcium and boron. A S/Se ratio of 3:1 was the best for shoot number and height and cane weight, although higher proportions of S produced the best sap properties. A Ca/B ratio of 20:1 appeared to be best for shoot height and weights of trash, roots and cane and ratios of 4:1 or higher for optimum sap properties.—Hindu Univ., Banaras.

1206. Chacravarti, A. S., Srivastava, D. P., and Khanna, K. L.
Use of synthetic hormone to step up sugar in cane.
Curr. Sci., 1955, **24**: 316-17, bibl. 7.

In large-scale field trials on 3 Bo. varieties spraying with 50 p.p.m. of the sodium salt of 2,4-D at 60 gal. per acre gave a highly significant increase in sugar recovery, sugar % cane and purity of mixed juices. The effect became noticeable after 2 days and remained unimpaired for 31 days.—Centr. Sugarcane Res. Stat., Pusa.

1207. Jan, O.
Burning of sugarcane and its effect on cane quality.
Agric. Pakistan, 1954, **5**: 106-13, bibl. 11.

The effects on cane weight, sucrose content and juice purity of burning cane before harvest to control leaf hopper (*Pyrilla* spp.) were studied on 3 Co. varieties in late-season experiments in March 1953 at the Sugar cane Research Station, Mardan. The main conclusions were: (1) Varieties with high fibre percentages deteriorated more slowly than those with lower percentages. (2) Burning did not lower cane quality and appeared to improve juices.

1208. GUILBEAU, W. F., COLL, E. E., AND MARTIN, L. F.
Effect of delay in grinding on value and processing quality of sugarcane juice.
Sugar J., 1955, **18**(2): 28, 30-1.

Data are given for cane weight loss, sucrose content, Brix value, purity and sugar yield of N.Co.310 plant and ratoon cane stored in heaps for various periods before milling. Recoverable 96° sugar per original ton of cane was 150 lb. after 1 day's storage, 134 after 9 and 115 after 14. The effects of delays between harvesting and milling on monetary returns are discussed.—S. reg. Res. Lab., New Orleans.

1209. MATTHEWS, A.
A new stubble shaver.
Cane Grs' quart. Bull., 1955, **19**: 10, illus.

The pulley attachment of a Ferguson tractor is bolted in a vertical position to the drawbar. The drive is from the power take-off and two universal joints are used to allow the shaver to be raised or lowered by the hydraulic lift. There are eight small blades attached to the ground plate. The disc is tilted at an angle of about 20° to the row. This prevents excessive friction between the disc and the cane stools. Approximately 2 to 3 inches of stubble is usually removed, but more can be removed if desired.

1210. LO, T. T.
N: **Co. 310 highly resistant to the root parasite Bunga.**
Sugar J., 1955, **18**(4): 46-7, illus.

In Taiwan N:Co. 310 and COX are very resistant to the parasitic plant *Aeginetia indica*; F. 134 is resistant, and F. 110, P.O.J. 2883, P.O.J. 3016 and P.T. 43-52 are very susceptible. 2,4-D at 1,000 p.p.m. destroys the flower stalks but not the roots.

1211. BUZACOTT, J. H.
Chlorotic streak control in Mauritius.
Cane Grs' quart. Bull., 1955, **19**: 43, illus.

A brief description is given of an ingenious dipping apparatus, in which the setts are placed on swinging shelves on a large revolving wheel. About 7,500 setts can be treated per hour.

1212. POLLOCK, J. R.
Hot water treatment against ratoon stunting disease.
Cane Grs' quart. Bull., 1955, **19**: 8-9.

Experiments with 16 varieties showed that in most cases hot water treatment at 50° C. can be extended to 2½ or possibly 3 hours without undue detriment to germination and that treatments of 2 hours at 51° and 1½ hours at 52° are also satisfactory. Germination of Q.55 was, however, seriously impaired by all the treatments tested.

1213. PIRES, J. A.
Major diseases of sugar cane in British Guiana.
Sugar Bull. Brit. Guiana Dep. Agric. **23**, 1955, pp. 71-5, bibl. 2.

Many varieties have been tested for resistance to leaf scald [*Xanthomonas albilineans*]. Among potential commercial varieties 44 Barbados seedlings, 2 Demerara seedlings and one other are classified as resistant. The effect of leaf scald on yield was examined in 2 trials, in which half the plants were inoculated and the remainder left as controls. Significant reductions in yield followed inoculation in one trial but not in the other.

1214. KAR, K., SRIVASTAVA, D. D., AND SINGH, D. R.
Control of red rot of sugarcane.
Curr. Sci., 1955, **24**: 277, bibl. 2.

In preliminary experiments on 4 Co. varieties in 3 localities 2% sprays of Dithane, Coppesan, Blitox and Perenox applied thrice at intervals of 4-6 weeks in July/September at 100-150 gal. per acre all reduced the percentage of leaves showing red rot [*Physalospora tucumanensis*] lesions on the midrib and the length of the lesions. The data presented show that Blitox and Dithane were the most promising materials and that there were varietal differences in response.—Main Sugarcane Station, Shahjahanpur.

1215. ZABALA, S.
El carbón de la caña de azúcar. **(Sugar cane smut.)**
Idia, 1955, No. 87, pp. 1-11, bibl. 12, illus.

Thanks to the replacement of susceptible by resistant varieties, smut (*Ustilago scitaminea*) is not at present a menace in Argentina. The results are given of inoculation tests and details of incidence on many varieties.—Estac. exp. Villa Alberdi, Tucumán.

Tea.

(*See also* 260f, 1234p-r, u, x, y, 1235n.)

1216. TEA RESEARCH INSTITUTE OF CEYLON.
Annual Report of the Tea Research Institute of Ceylon for the year ended 1954, 1955, pp. 64, being *Bull.* **36**.

Work covered by this report includes: *Chemistry:*—Soil studies, Mg deficiency, Mn and soil pH, low-country chlorosis possibly due to excess Mn, ammonium *vs.* nitrate N. *Technology:*—Low-temperature withering, effect of age from pruning, greenness and maltiness in liquors. *Physiology:*—Selection and vegetative propagation, green manures, weedkillers, treekillers. *Pathology*: Acaricides, reinfestation of tea by scarlet mite, albizzia mite. *Mycology:* Blister blight and rhizoctonia control, tea mycorrhiza studies, low-country dieback, insecticide and fungicide taint trials. *Low-country substation:*—Clonal trial, nursery shading, pruning cycle in relation to rhizoctonia control, shot-hole borer control, shade, red ant control, pruning cycles. [See also separate abstracts.]

1217. TEA RESEARCH INSTITUTE OF EAST AFRICA.
Annual Report of the Tea Research Institute of East Africa, 1954, 1955, pp. 42.

Agricultural Department. Manuring. 200 lb. ammonium sulphate caused a significant response in unshaded tea at all 3 stations, but not in shaded tea. Mulch continued to give significant yield increases at one station and there was a significant, but possibly fortuitous, interaction between phosphate and mulch. In a factorial experiment at Tukuyu the % increments of crop attributable to N increased in the successive years of the 4-year pruning cycle except for a small reduction in the 3rd compared with the 2nd. The effect of N in lb. increase in crop per lb. N applied was greatest in the 2nd year; this was the year of peak yield, and both the 3rd and 4th year yields were below the mean annual yield up to, and including, the year concerned. Recommendations on the basis of the experiments are: (1) 40 lb. N per acre should be applied in the first year of the pruning cycle and higher amounts in succeeding years. (2) P and K have given no response yet and applications should be based on the amount removed by the crop. (3) Where S deficiency occurs N should be applied as ammonium sulphate. (4) Artificial manures should not be applied to heavily-shaded tea. (5) A mulch is of value where a long dry season is experienced and can be provided cheaply by growing shade trees *in situ*, *Grevillea robusta* being the best available. *Establishment of tea from cuttings*. In the once-stumped *vs*. twice-stumped experiment [see *H.A.*, 25: 1111] shoot elongation and number of shoots were both significantly greater in the once-stumped plants. *Weedkillers*. The couch grass (*Digitaria scalarum*) control experiment [see *H.A.*, 25: 455] was continued using only TCA at 20 and 60 lb. per acre. Dry-season treatment had little effect, but wet-weather application resulted in the death of 31% and 42% of the rhizomes compared with 16% in the control. *Chemistry Department*. The chemistry of tea fermentation and the effect of copper were studied.

1218. Portsmouth, G. B.
Tea selection and vegetative propagation.
A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 38-40.

In the 1947 clonal area clones 2024, 2026 and 2025 have given the highest calculated yields for the 1st year of the 2nd cycle, namely, 3995, 3530 and 3200 lb. per acre respectively. In addition to giving a record yield clone 2024 produces teas of better than average quality. Data on banji [dormant bud] production show that some clones produce more banji than others but that there is no obvious relation between banji production and yield. In the blister-resistant area the following clones continue to be the most promising: 2065, 2086, UR12, OK4, TK48, DI, MT/BG, KEN15/2, 16/3 and 22/1, KEW14/1, 4/A4, S106 and 123, and B8. In the 1937-1941 clonal area clone 1114 has given the highest mean annual yields for each of the 1st 3 cycles, namely, 958, 1700 and 2671 lb. per acre.

1219. Flémal, J.
Production de graines et de boutures de théiers à Mulungu. (**Production of tea seed cuttings at Mulungu.**)
Bull. Inf. INEAC, 1955, **4**: 225-37, illus.

Isolated polyclonal gardens are being established for the production of seed from selected clones of Assam tea introduced to the Belgian Congo in 1930/32. Selection is based on yield and quality, the latter being determined from samples prepared with specially designed rolling, fermenting and drying laboratory equipment. The method by which selected clones are multiplied from single-leaf, softwood cuttings is described.

1220. Portsmouth, G. B.
Continued propagation.
A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 40-1.

In an experiment to determine whether the continued vegetative propagation of a clone leads eventually to degeneration, batches of cuttings of clone No. 2024 were taken and propagated side by side in the same nursery beds from the following three sources: A. Mother bush, 16 years old; B. 6-year-old plants grown from cuttings taken off A; C. 3-year-old plants grown from cuttings taken off B. After 7 months the rooting percentages and the total dry weights of roots and of shoots were: A, 88·3%, 0·13 g. and 0·79 g. respectively; B, 86·7, 0·13 and 0·79 respectively; C, 85·7, 0·14 and 0·81 respectively.

1221. Portsmouth, G. B.
Polythene packing for cuttings.
A.R. Ceylon Tea Res. Inst. 1954, 1955, p. 40.

In one trial cut shoots tied together with a small wad of wetted cotton wool round their basal ends and packed in 150 gauge polythene tubes sealed at the ends were kept for 2 weeks. Internodal cuttings were then made and propagated; after 2 months all were alive, 52% having rooted and the rest callused.

1222. Guinard, A.
Essais de bouturage en place de jeunes rameaux de théiers. (**Experiments on the direct planting of cuttings from young branches of tea.**)
Bull. C.N.R.S.T., Viêtnam, 1955, No. 3/4, pp. 7-11.

The advantages of planting tea cuttings direct are: (1) it eliminates the delicate and expensive operation of transplanting and (2) it permits the results of vegetative selection to be applied to hedge planting, since it is impracticable to try to plant rooted cuttings with balls of earth at the close spacing required to form a hedge. Dormant-budded, single-node, softwood cuttings with the upper leaf intact were hedge-planted at 10 × 10 cm. in bands 1·2 m. wide in 2 experiments. (1) In a shading experiment 8 clones were planted between *Tithonia* hedges in late January and given water equivalent to 2 mm. rainfall on each rainless day. The average strike was 74% for cuttings callused in sand before planting and shaded with *Tithonia* shoots, 63% for cuttings planted direct under *Tithonia* shade, 51% for cuttings planted direct under straw shade and 42% for cuttings planted direct under cut fern shade, the average for the 4 treatments being 57%. (2) In a time-of-planting experiment during the rainy season 6 clones were planted between *Tithonia* hedges at 2-monthly intervals. The results were much poorer than those obtained in the dry season, partly owing to excessive soil moisture but mainly because of excessive shade. The best average result was that from October planting, namely, 35 per cent.

1223. Guinard, A.
Haies de théiers, 1950. (**Tea hedges, 1950.**)
Bull. C.N.R.S.T., Viêtnam, 1955, No. 3/4 pp. 12-14, illus.

Further information is given on hedge planting experiments [see *H.A.*, 24: 2067]. *Yields.* The 6 pruning treatments in descending order of yield were: (1) double-sloped "pulpit" hedge 1·4 m. wide with apical angle of 60° 75·3 kg.; (2) double-sloped pulpit hedge 1·2 m. wide with apical angle of 90° 67·7 kg.; (3) flat-topped hedge 1·2 m. wide, topped at 0·8 m., 66·7 kg.; (4) flat-topped hedge 1·3 m. wide, topped at 0·4 and then at 0·6 m., 64·7 kg.; (5) flat-topped hedge 1·2 m. wide, topped at 0·6 m., 59·4 kg.; and (6) flat-topped hedge, topped at 0·2 and then 0·4 m., 40 kg. *Topping height.* Experience shows that topping is best performed in 2 stages, a first cut at 0·4 m. being followed by a second at 0·6 m. when the shoots arising after the first cut reach 0·8 m. *Pulpit hedges.* The double-sloping table has a larger plucking area than the flat table namely, 4·5 sq. m. compared with 2·5 sq. m. for hedges 1·2 m. wide. Maintenance is just as easy. *Conclusion.* The very high yields previously reported have been maintained. The calculated yield per hectare of dry leaf for hedge type 4 was 2420 kg. and that for hedge type 1 3,000 kg.

1224. Lamb, J., Portsmouth, G. B., and Tolhurst, J. A. H.

A guide to the manuring of Ceylon tea, 1955.

Pamphl. Tea Res. Inst. Ceylon **1**, 1955, pp. 8.

Recommendations are made on fertilizer mixtures for tea in bearing, young tea and seed bearers, and on frequency and method of application.

1225. Gokhale, N. G.

Estimating the decrease in yield on ceasing to manure unshaded tea.

Emp. J. exp. Agric., 1955, **23**: 96-100, bibl. 3.

With two experiments on unshaded tea in north-east India as a basis, the decrease in yield in the years immediately following cessation of manuring with nitrogen is examined. It is shown that, under certain simplifying conditions, the changes in yield with time can be calculated from an exponential equation, if equilibrium yields or the values of two constants are known. The yield drops very rapidly during the first and second years after ceasing to manure. [Author's summary].—Tocklai exp. Stat.

1226. Tolhurst, J. A. H.

Plant nutrition. Magnesium deficiency.

A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 26-8.

The symptoms of Mg deficiency on the first fully matured leaf below the flush are dullness of surface, a sickly green colour with a yellowish brown mosaic towards the centre and between the main veins, very marked upward folding and brittleness. These show before the yield is much affected but in advanced cases the yield falls rapidly. Provisional recommendations for control are the application of a dressing of 5 cwt. local dolomite per acre as a prophylactic. The addition of epsom salts to the copper spray is being tested as an alternative. [See also *H.A.*, 25: 3358.]

1227. Keegel, E. L.

Effect of age from pruning.

A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 35-6.

Leaf from bushes of a good-quality and of a mediocre clone aged 9, 21 and 33 months from pruning at the beginning of the experiment was manufactured monthly for a year by the mincing machine method. Colour and quality were assessed on the basis of marks out of 10. In both clones the colour ratings were 6, 6 and 5 for the 3 periods 9–21, 21–33 and 33–45 months from pruning respectively. In the mediocre clone the quality rating was constant at 5 at all ages from pruning. In the good-quality clone it rose from 7 in the first 2 periods to 8 in the third. It is tentatively concluded that improvement in quality after a certain age from pruning is marked only in good-quality clones.

1228. Laoh, J. P.

Observations on spraying and dusting of copper fungicides against blisterblight (*Exobasidium vexans* Massee) in tea.

From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

Both a copper dust and an emulsified copper naphthenic acid spray controlled blister blight of tea in Java. The use of the spray was more convenient, but the quality of the tea from the sprayed area was inferior.—Exp. Stat. C.P.V., Bogor, Indonesia.

1229. Webster, B. N.

Blister blight.

A.R. Ceylon Tea Res. Inst. 1954, 1955, pp. 50-2.

In a trial at St. Coombes spraying during both monsoons gave a 62% increase and spraying during the south-west monsoon alone a 46% increase in crop compared with the unprotected control. In a trial on Clarendon Estate Sandoz 53 and Cuprokylt gave good protection, Sandoz ordinary satisfactory protection and Geigy 50 no protection.

1230. Webster, B. N.

Insecticide and fungicide taint trials.

A.R. Ceylon Tea Res. Inst. 1954, 1955, p. 53.

Of the 9 compounds tested Chlorobenzilate, Dieldrex 15, chlorodox and CAA experimental fungicide produced no taint, Duphar lindane, F.W. 293 acaricide emulsion, F.W. 293 dispersible emulsion and Karathane produced a suspicion of taint at the first plucking after application but none at the second plucking, and T. 120 sulphur emulsion produced taint at both first and second pluckings.

Sundry crops.

(*See also* 1235k, o.)

1231. Wallace, G. B., and Wallace, M. M.

Sudden death disease of cashew trees in Tanganyika—a preliminary note.

E. Afr. agric. J., 1955, **21**: 42-3, bibl. 2.

The symptoms are described of a disease of cashew trees, which appears to be caused by a fungus indistinguishable from *Valsa eugeniae*, the organism causing sudden death disease in cloves. Control is likely to prove difficult, but as a precaution all diseased trees should be burnt.—Dep. Agric., Tanganyika.

1232. Miller, E. V.

An antioxidant in the fruits of the carambola (*Averrhoa carambola*).

From abstr. in *Plant Physiol.*, 1955, **30** (Suppl.): xxxvii.

Carambola fruit juice was found to contain a substance which retards oxidation of ascorbic acid. When orange juice containing 10 and 25% carambola juice was held for 2 weeks at 5° C., the retention of ascorbic acid was 83 and 91%, respectively, of the original. In orange juice alone 77% of the original ascorbic acid was retained. When aqueous solutions of ascorbic acid crystals were held at 20° C. for 1 week the loss was more than 90% of the original. With 10% carambola juice the pure solution lost only 8% of the original amount. When 1 ml. of dandelion root extract was added to 99 ml. of ascorbic acid solution, almost all of the ascorbic acid was destroyed after 1 week at 20° C. The addition of 10% carambola juice to the mixture reduced ascorbic acid loss to 12·5% of the original.—Dep. biol. Sci., Univ. Pittsburgh.

1233. SRIVASTAVA, H. C., AND MATHUR, P. B.
Studies in the cold storage of langsats.
J. Sci. Food Agric., 1955, **6**: 511-13, bibl. 5, illus.

Langsats (*Lansium domesticum*) were stored at temperatures ranging from 47° to 83° F. The lower the temperature the lower was the loss in weight, but the percentage wastage was lowest at 52–55° F. The percentage of total soluble solids and reducing sugars increased during storage at all temperatures used. The respiration rate increased with storage temperature. Decay during storage was shown to be due to *Rhizopus nigricans* and *Aspergillus luchuensis*. It is concluded that the optimum conditions for storing langsats are a temperature of 52-55° F. and an R. H. of 85–90%. The approximate cold storage life is 14 days.—Centr. Food technol. Res. Inst., Mysore, India.

Noted.

1234.

a ANON.
Budgrafting success.
Plant. Bull. R.R.I.M., 1955, No. 20, pp. 83-8, illus.
Recommended procedure for budding hevea.

b ANON.
Frost-damaged coffee trees in Paraná show recovery; substantial 1955 production expected.
Foreign Crops Mkts, 1955, **70**: 457-8, from abstr. in *Trop. Abstr.*, 1955, Vol. **10**, No. c 2077.
Recovery of trees aided by not pruning.

c ANON.
Parasitic flies may aid in sugarcane borer control.
Sugar J., 1955, **18**(3): 30.
Metagonistylum minense and *Lixophaga diatraeae* promising against *Diatraea* in Louisiana.

d ANON.
Selection of coffee plants for propagation, raising seedlings in the nursery, planting them in the field and their aftercare.
Indian coffee, 1955, **19**: 147-50.
Propagation of coffee plants.
Plant. Chron., 1955, **50**: 520-2.
A summary of recommendations.

e ANON.
Smoke houses.
Plant. Bull. R.R.I.M., 1955, No. 21, pp. 104-6, illus.
Planning, construction and operation of of R.R.I.- and Subur-type smoke houses.

f BAPTIST, E. D. C., AND DE JONGE, P.
Stimulation of yield in *Hevea brasiliensis*.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
For another account see *H.A.*, 25: 4405.

g BAPTISTA, M.
Notes on cacao in San Tomé and Principe. [French summary 1 p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 98-100.
Acreage, yields, manuring, fermentation and drying, pests and diseases.

h BARTLEY, B. G. D.
Principles and prospects of cocoa improvement.
J. Agric. Soc. Trin. Tob., 1955, **55**: 149-56.
In Trinidad, by breeding and selection of clones.

i BERNAL, D. E.
Détermination chromatographique du caoutchouc dans les latex végétaux. **(Chromatographic determination of rubber in plant latices.)** [English, German, Spanish and Italian summaries 9, 8, 12 and 9 lines.]
Rev. gén. Caoutch., 1955, **32**: 889-92, bibl. illus.
Separation of the rubber hydrocarbon by paper chromatography.

j BIRKETT, L. S.
The variety and fertilizer position of the sugar industry. XX.
Sugar Bull. Brit. Guiana Dep. Agric. **23**, 1955, pp. 53-63.
Acreages, yields, etc. by varieties in B.G. for 1954.

k BOLHUIS, G. G.
Some observations on the fructification of the groundnut.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
At Lab. trop. Plant Breed., Wageningen.

l BOLOGNA, L. M.
Nota sulla produzione caffeicola nell' Oubangui-Chari (A.E.F.) **(Coffee growing in Ubangi-Shari, French Equatorial Africa.)**
Riv. Agric. subtrop., 1955, **49**: 225-34, illus.

m CHAMINADE, R.
La culture de la canne à sucre aux Antilles françaises. **(Sugar cane growing in the French West Indies.)**
C.R. Acad. Agric. Fr., 1955, **41**: 495-500.
Soil types and cultural methods in Guadeloupe and Martinique.

n CRÉNIN, C.
Sur les latex centrifugés. Évolution de leurs propriétés et moyens de limiter ses variations. (**Properties of centrifuged latices: their development and means of limiting their variation.**) [French and English.]
Rev. gén. Caoutch., 1955, **32**: 893-9 (French) and 913-19 (English), bibl. 8.

o CYCLONE AND DROUGHT INSURANCE BOARD, MAURITIUS.
The origin and operation of the Cyclone and Drought Insurance Fund, Mauritius.
Trop. Agriculture Trin., 1955, **32**: 290-4.
A sugar production insurance scheme.

p D[AS], G. M.
Control of termite attacking live wood of tea.
Ser. Tea Res. Inst. Tocklai **77/1**, 1955, pp. 5.
Control of *Microcerotermes* sp. by mechanical means and with aldrin or dieldrin.

q D[AS], G. M.
Helopeltis theivora Waterh. (**Tea helopeltis.**)
Ser. Tea Res. Inst. Tocklai **106**, 1955, pp. 4.
Including control with DDT.

r D[AS], G. M., AND OTHERS.
Proprietary insecticides, fungicides, selective weed killers and preservatives.
Ser. Tea Res. Inst. Tocklai **86/1**, 1955, pp. 7.
Products recommended for use in tea gardens.

s D'SOUZA, G. I.
Training of arabica bushes in relation to crop improvement on the Bababudangiris.
Indian coffee, 1955, **19**: 156-8.
Nursery practices and the pruning of young bushes.

t DUCKE, A.
As espécies brasileiras do gênero *Theobroma* L. (**The Brazilian species of *Theobroma*.**) [English and French summaries ⅔ and ⅓ p.]
Bol. téc. Inst. agron. Norte, Belém, 1953, No. 28, pp. 3-20, bibl. 15 [received 1955].
Botany, uses, ecology and distribution of the 10 Brazilian species.

u D[UTTA], S. K.
Skiffing of tea in the rains.
Ser. Tea Res. Inst. Tocklai **66/1**, 1955, pp. 2.
Skiffing is cutting across bushes grown beyond plucking stage.

v FOSTER, R.
Laboratory observations on the effects of insecticides on the white coffee borer beetle.
E. Afr. agric. J., 1955, **21**: 6-9, bibl. 1.
Dieldrin and endrin more effective against *Anthores leuconotus* than DDT and chlordane.

w FRÈRE, J.
Le girofle à Zanzibar. (**The clove in Zanzibar.**) [English and Spanish summaries 12 and 13 lines.]
Agron. trop., 1955, **10**: 485-98, illus.

x G[LOVER], P. M.
Organisation of spraying.
Ser. Tea Res. Inst. Tocklai **93/1**, 1955, pp. 6.
Equipment, high and low volume spraying and organization.

y G[LOVER], P. M., D[UTTA], S. K., AND S[ARMAH], K. C.
Tea seed nurseries.
Ser. Tea Res. Inst. Tocklai **108**, 1955, pp. 7.
Advice on all aspects of nursery practice.

z GODEFROY, B.
Le caoutchouc au Libéria. (**Rubber in Liberia.**) [In French and English, with German, Spanish and Italian abstracts 12, 11 and 11 lines.]
Rev. gén. Caoutch., 1955, **32**: 850-60, illus.
Area, plant material and production of the Firestone estates.

1235.

a GRIMALDI, J.
Étude d'un procédé individual de fermentation du cacao au Cameroun. (**Development of a new method of fermenting cacao in the French Cameroons.**) [English summary 3 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 69-70.
See *H.A.*, 25: 2148.

b GRIMALDI, J.
La maladie du déssèchement des extrémités du cacaoyer au Cameroun. (**Cacao dieback in the French Cameroons.**) [English summary 10 lines.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 56-8.
H.A., 25: 2260q relates to a similar paper.

c HENDRIKS, J. A. H.
Land classification in an unreclaimed region in Surinam.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*

d HOROVITZ, S.
Sex in *Carica papaya*.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4.*
A cytogenetical study.—Fac. Agric., Maracay, Venezuela.

e KIRKPATRICK, T. W.
Notes on minor insect pests of cacao in Trinidad.
A.R.Cacao Res. I.C.T.A. 1954, 1955, pp. 56-7, bibl. 5.
Toxoptera aurantii and *Aphis craccivora.*

f KNUST, H. G.
Cutter-dip-planter.
Cane Grs' quart. Bull., 1955, **19**: 57, illus.
Notes on a new Australian cane planter.

g MACLEAN, J. A. R.
Some chemical aspects of black-pod disease in West African Amelonado.
Proc. W. Afr. int. Cacao Res. Conf. 1951, Tafo, pp. 64-6, bibl. 8.
See *H.A.*, 24: 3137.

h MAYNE, J. E.
Machines in tropical food crops.
New Commonw., 1955, **30**: 226-30, illus.
For land clearing and weed control.

i DE MEDINA, A. R.
Possibiladades de produção de café em Moçambique. (**The possibilities of coffee growing in Mozambique.**)
Rev. Café portug., 1955, **2**(6): 16-33, illus.
Only certain localities are suitable.

j MOSS, A. E.
Swollen shoot disease in the Gold Coast. [French summary 1 p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 28-32.
The cutting-out campaign.

k RAO, P. S. AND DICKEY, E. E.
Composition of tamarind kernel powder.
Sci. and cult., 1955, **21**: 102, bibl. 10.

l SABATIN, E., JU.
Bananas in the Soviet sub-tropics. [Russian.]
Priroda, 1955, **44**(8): 101-3, illus.
Notes on *Musa* spp., mainly ornamental.

m SANDISON, S.
The tapping of young rubber.
Planter, 1955, **31**: 483-6.
Note on undesirable features of existing practice.

n S[ARMAH], K. C.
Black rot (*Corticium invisum* and *Corticium theae*).
Ser. Tea Res. Inst. Tocklai **8/2**, 1955, pp. 4.
Conditions favouring attack, and cultural and chemical control.

o SAVUR, G. R.
Tamarind seed polysaccharides.
Curr. Sci., 1955, **24**: 235-6, bibl. 7.

p SCHEXNAYDER, C. A.
Symptoms and losses caused by the stunting disease of sugar cane in Louisiana.
From abstr. in *Sugar J.*, 1955, **18**(5): 37.

q SCHWEIZER, J.
Mengalir keluarnja lateks dari *Hevea brasiliensis*. (**Latex flow in *Hevea brasiliensis*).**
Tehnik Pertanian, 1955, **4**: 149-71, from abstr. in *Trop. Abstr.*, 1955, **10**, No. c2234.
Physiological processes described.

r THOROLD, C. A.
Control of black-pod disease of cacao in Nigeria. (French summary ½ p.]
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 53-6, bibl. 5.
For another account see *H.A.*, 24: 1960.

s TOLLENAAR, D.
Control of sigatoka (banana leaf spot disease) by mist blowing.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.
See *H.A.*, 25: 3255.

t ULLAH, H., AND ALI, S.
Fruit growing industry in the Punjab—A statistical analysis.
Punjab Fruit J., 1955, **19**(70/71): 5-9, bibl. 4, map.

u U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
Coffee in the Dominican Republic.
Foreign Agric. Circ. **FCOF 12-55**, 1955, pp. 10.
Acreage, yields, production and exports.

v WICKENS, R.
Cacao fermentation.
Proc. W. Afr. int. Cacao Res. Conf. 1953, Tafo, pp. 67-8, bibl. 5.
Problems and ways of overcoming them.
See also *H.A.*, 24: 1967.

w WIERSUM, L. K.
Consideration regarding practical and physiological research on yield stimulation of *Hevea brasiliensis*.
From summary *Pap. 14th int. hort. Congr., 1955*, Scheveningen, *see note p. 4*.
See *H.A.*, 24: 1017x, and 3190 and 25: 4406.

NOTES ON BOOKS AND REPORTS

Books.

1236. ADRIANCE, G. W., AND BRISON, F. R.
Propagation of horticultural plants.
McGraw-Hill Book Co., N. York, Toronto and London, 2nd edition, 1955, 9 × 6 in. pp. ix + 298, bibls., illus., $6.50 or 49s.

This new edition will still serve to stimulate and interest potential students of horticulture. Each chapter ends with a list of references selected for further study and thus the aim to provide a text for basic courses in horticulture may well have been fulfilled. The authors, however, go rather far when they claim to have provided a practical guide for horticulturists and to have described in detail the commercial propagation of the more important plants. For as a practical guide it provides insufficient detail, and the plant list, except for the rose, is confined to fruits and a few nuts.

When we reviewed the first edition [*H.A.*, 10: 1265] we generally praised its clarity but were somewhat critical of certain omissions, the number of which has now grown with the advent of new techniques. For example, today's student will here learn very little of value concerning the use of growth substances, humidification, or even the latest advances in mechanization, and he may look in vain for details of recent grafting techniques. On the other hand, he will find very many intriguing ideas born of isolated bits of research, which may lead him to the useful classified references and so on to horticultural works unlimited. Thus the value of this book is for the beginner, in that it provides him with an introduction to the principles concerned in plant growth, whetting his appetite, and pointing the way to further sources of knowledge.

R.J.G.

1237. Balcar, J., and Škula, K.
Cigarettadohányok termesztése. **(Cigarette-tobacco growing.)**
Allami Mezőgazdasági Könyvkiadó n.v., Bratislava, 1953, 8 × 5½ in., pp. 264 + figs. and illus., pp. 78, price Kčs 60.

This book describes cigarette tobacco production in Czechoslovakia, where it is concentrated in south Slovakia and south-east Moravia. In the former, which is by far the more important area, Hungarian is the language commonly spoken and this no doubt explains why the book is written in Hungarian. Following a historical introduction, four chapters are devoted to the physiology, composition, varieties and ecology of the tobacco plant. Two further chapters give a comprehensive description of cultural and harvesting methods, including pest and disease control, and others are devoted to curing and fermentation, seed production for both sowing and oil, and experimental and breeding work. The final chapter explains the organization of the industry. The book contains a 10-page classified bibliography, a short subject index and a large number of illustrations.

1238. Brouwer, W., and Stählin, A.
Handbuch der Samenkunde für Landwirtschaft, Gartenbau und Forstwirtschaft. **(Handbook on seeds for agriculture, horticulture and silviculture.)**
D.L.G.-Verlags-G.m.b.H., Frankfurt am Main, 1955, 9½ × 7 in., pp. 656, bibl. 69, illus., DM. 96.40.

With the help of many botanic gardens and seed firms the authors, professors at the Agricultural College of Stuttgart-Hohenheim, built up a large collection of temperate crop seeds from which they compiled over 2,500 exact descriptions, most of them illustrated by line drawings of excellent clarity (pp. 21-540). The material, which includes the seeds of some important weeds, is arranged alphabetically by families, within the families by genera. A key of particularly simple design facilitates the identification of individual seeds within eight main groups by easily recognizable external characteristics (pp. 543-624). The absence of any similarly comprehensive handbook on seeds enhances the importance of this well-produced manual to readers in English-speaking countries. In anticipation of such a demand English common plant names are incorporated in the text and in the detailed subject index (pp. 628-55).

V.H.G.

1239. Goodspeed, T. H.
The genus *Nicotiana*. Origins, relationships and evolution of its species in the light of their distribution, morphology and cytogenetics.
Chronica Botanica 1954, **16** (1/6): i-xxii and 1-536, 9½ × 6 in., bibl. 398, illus., $12.50.

Among the noteworthy features of genetical research during the past half-century is the impetus it has given to the taxonomic study of certain genera of plants. For these studies species have been collected from all over the world, their morphological characters have been examined in new and greater detail, and the genetical and cytological behaviour of both them and their hybrids has been investigated. As a result, information has been amassed which must be fundamental to any taxonomic, as well as genetic, appraisal of the group and its evolution.

Studies of this kind have been in progress on the genus *Nicotiana* for nearly fifty years at the hands of Dr. Goodspeed and his collaborators (among whom R. E. Clausen must receive special mention) in the University of California. The outcome of the work is now made available to us in a single comprehensive volume. The first five parts of the monograph cover the distribution, morphology and cytology of the species and their hybrids, and the phylesis of the genus. The sixth part, in the preparation of which H.M. Wheeler and P. C. Hutchinson have collaborated with Dr. Goodspeed, provides full taxonomic descriptions of all the many species which are sufficiently known, together with keys for their identification.

In the main the book is devoted to the presentation of the observations which have been made on the distribution, morphology and cytology of the genus, and a vast amount of information it provides. At various places, however, and especially at the end of the chapters, short comments are interpolated on the interpretation and significance of the observations. The first chapter also gives a brief statement of the aims and argument, while the last two of part five deal respectively with the past evolution and the future prospects of the genus. The scheme suggested for the origin, evolution and relationships of sixty species, involving as it does both the differentiation of three great lines of descent and their subsequent interplay in allopolyploidy, will be read with interest; but it is a disappointment to find only brief mention of such properties as the inbreeding and outbreeding of the various species, which recent developments in the study of population genetics has shown to be of great significance. This is especially so as the genus would seem to offer excellent material for an investigation of the rise and distribution of inbreeding and outbreeding devices, and of their relations to one another and to such factors as polyploidy, habitat and geographical distribution.

It is, however, as a compendium of information that Dr. Goodspeed's book must be judged, and by this test it must secure its place among the various monographs which have been appearing of recent years, and in which the technique of genetics and cytology have been added to the older methods of study to give us a broader basis for our taxonomic and evolutionary judgments. Reference to it can hardly be avoided by anyone interested in the newer taxonomy or in the genus *Nicotiana*.

K.M.

1240. Holly, M.A.
Agriculture in Haiti.
Vintage Press, Inc. 120 W.31 Street, New York 1, 1955, 8 × 5 in., pp. 313, bibl. 51, $3.50.

Haiti in the West Indies gained her independence from

France 150 years ago and since then has existed somewhat precariously with little or no external assistance. Between 85 and 90% of her population are peasants engaged in subsistence farming, supplemented by the rather haphazard production of a few export crops, notably coffee. Apart from a few sugar and sisal estates, the large-scale plantation agriculture, which is a characteristic feature of most of the West Indian islands, is absent. There is thus little in the way of progressive elements, from which the peasant may obtain new ideas or improved planting material. In the materialistic and rather hypocritical jargon of the modern peripetatic expert Haiti is one of the under-developed territories of this misguided world.

Mr. Holly, however, is not a visiting expert, here today and gone tomorrow, but a Haitian, who has held a variety of agricultural posts at home and abroad, and who has added to this background the experience of a course in rural economics at Oxford University.

The aspects he deals with are primarily sociological and economic. His main theme is that, although Haiti offers considerable opportunities for agricultural development, the peasant under present conditions is in no position to take advantage of them. Illiteracy, conservatism in outlook, superstition and disease have all been obstacles to advance. So, too, have been unsatisfactory systems of land tenure, soil erosion, an inadequate road system, primitive marketing arrangements, lack of capital, and lack of credit facilities other than those provided by moneylenders or produce dealers. The main hope for the future lies in a better system of education, which, in association with other measures, should lead to the creation of a more substantial class of farmer owning areas of land large enough to permit the building up of capital.

Throughout the book the influence of Mr. Holly's sojourn at Oxford is apparent, and in making comparisons he draws freely on the experience, both historical and modern, of Britain and other countries. Much of this he does by quotations, and, although these are often erudite and usually apt, they are frequently very long and inclined to be repetitive. To the non-Haitian reader this may make parts of the book rather heavy going, but it must be remembered that Mr. Holly's main target is the educated Haitian, usually a townsman, and—a prophet in his own country needs all the outside aid he can muster!

Finally, Mr. Holly touches on the political failings of the past and the political enlightenment of the present. Here it is perhaps unwise for a not-too-enlightened foreign reviewer to comment, except to say that in dealing with past mistakes, such as a coconut planting fiasco, Mr. Holly calls a spade a spade but reveals no bitterness. He is, in fact, no scatter-brained extremist but a person objective and liberal in outlook. It is much to be hoped that his book will contribute to the progress he so clearly desires and may also furnish some ideas to people in other countries faced with similar problems.

G.K.A.

1241. NIGHTINGALE, G. T.
Horticultural Science.
Horticultural Publications, Rutgers Univ.,
New Brunswick, N.J., 1955, 9½ × 6½ in.
pp. 111, bibls, illus., $2.50.

This slim book is based on the course given to undergraduate students of Rutgers University, who have already done some plant physiology. It is almost entirely a laboratory course. Carbohydrates and proteins are taken as the chief points of reference throughout.

Each chapter, after a preliminary discussion of a particular theme, includes details of one or more laboratory exercises to illustrate the theme, and these are followed by questions which the student might be expected to have to answer on the theme. Finally references to relevant literature are given. Chapter headings are: Protein-carbohydrate relationships; Growing plants in sand culture; Photoperiodism; Nitrate assimilation; Ammonium assimilation and urea; Protein synthesis and re-utilization; Photoperiod, temperature, light, other factors; Carbohydrates; Nutrient and soil solutions; Oxygen deficiency in soil; Temperature effects; Ion inter-relations; Macro-nutrient deficiencies; Micro-nutrient deficiencies; The field log.

1242. PARSONS, H.
Grapes under glass.
Collingridge, London, 1955, 8½ × 5 in.,
pp. 64, illus., 10s. 6d.

The art of grape growing was perhaps better understood in Victorian and Edwardian times than it is today when high costs in every direction have forced many to become their own gardeners. Economies invariably start with the garden as nurserymen are only too well aware. The backbone of England, the middle classes, who do most of the gardening these days as well as pay most of the taxes, have always considered grapes as luxuries, useful chiefly to keep the conversation going when visiting the sick but otherwise seldom to be consumed without a feeling of guilt. The cheap foreign importations which can be obtained at all seasons, some redolent of the used stable litter in which they appear to be packed but others of excellent quality, further contribute to the impression that growing grapes for oneself is a waste of time and too difficult anyway. Since no imported grape can approach in quality or appearance the well-grown English glasshouse product the first argument may be passed over. The practical difficulties remain. It is the purpose of this book to show how they may be overcome. As Head Gardener at Sandringham Mr. Parsons is a perfectionist and is unlikely to have had to cope with difficulties which commonly beset amateurs, such as total ignorance, the price of coke and ancient greenhouses that shed their panes whenever the wind exceeds Force 4. But in the matter of how to grow grapes in the grand manner, by which is meant as it should be done regardless of time, money and the rest, and leaving the amateur to devise his own improvisations, the book could not be better planned. It is quite short, contains no padding and the reason for each cultural manoeuvre is explained in terms of what happens if it is carried out and what if it is not. This method is helpful to the unversed and comforting too, since sins of omission are seen not always to prove so fatal as the over-anxious amateur is apt to imagine. The chapters follow the usual pattern of fruit manuals, covering propagation, planting, training, pruning, general management, pests and diseases. The book ends with a list of selected varieties and some useful notes on each. This is a thoroughly competent book written by an obvious expert and for these days not expensive. G.StC.F.

1243. Pearl, R. T. (Editor).
Fifty years on. A jubilee history of the Horticultural Education Association 1905-1955.
Gibbs & Sons, Orange St., Canterbury, 1955, 10 × 6 in., pp. 127, illus., for private circulation apart from a limited number of copies available only to libraries, price 15s. post free.

This publication with its elegant small text illustrations by L. N. Staniland is first and foremost a family affair, if one may be permitted to consider those largely responsible for horticultural education in the U.K. and Ireland as one large family, and those who have been most intimately connected with the work of the Association will inevitably find its gay reminiscences of important events particularly to their taste.

In addition, however, the account given here of formation of branches, committee work, conferences and finally publications could be of considerable value to overseas horticulturists desirous of forming such a society in their own countries. Essentially it tells the tale of the formation and development of a society of very hardworking men and women who by sheer force of character and determination have effectively and favourably influenced the course of horticultural education, even of research, in Great Britain. The Society has never had the glamour which attaches to the Royal Horticultural Society, but it has successfully breasted and overcome the upheaval of two world wars and seems now more firmly set than ever to watch and influence the future of horticulture in these islands.
D. A.

1244. Renault, R.
Chimie agricole. Tome I. Chimie végétale.
(Agricultural chemistry. Volume I. Plant chemistry.)
Published jointly by Eyrolles and Gauthier-Villars, Paris, 9½ × 6 in., pp. 486, 3,400 fr. or 3,950 fr. post free.

The subjects covered are:—The chemical composition of the different parts of the plant, including the cell constituents, the pigments and the secretions (189 pp.); plant nutrition, including that of minerals and nitrogen, carbon assimilation, water requirements and absorption and the nature and circulation of sap (50 pp.): synthesis of chlorophyll, proteins and lipids (59 pp.); metabolism including the creation and utilization of reserves, and the metabolism of soluble carbohydrates, proteins, lipids, and respiration (48 pp.); biocatalysts, including growth substances, vitamins and viruses (17 pp.); the biochemistry of growth phenomena, including maturation germination and vegetative propagation (22 pp.); plant morphogenesis and chemistry (8 pp.); and, as a supplement, microbes and their chemical activities (56 pp.). There are indexes of subjects, botanical names and authors cited but there is no bibliography.

1245. Reynolds, P. A.
Maintenance of horticultural equipment.
Allen & Unwin, London, 1955, 9 × 6 in. pp. 183, illus., 16s.

A book of this nature has been wanted for long enough, since the buying of good machinery for a small-holding can turn out to be an expensive disaster unless such machinery is properly cared for.

Nearly half the book is devoted to the cost and costings, choice, working, repairs, upkeep and transmission of power from any one of the many small two-wheeled machines now on the market. Instructions are clear and clearly illustrated even to the non-mechanical minded. The practical care of the diesel engine is next explained, and then in succession comprehensive, and always essentially practical, attention is given to: electricity on the holding; water supplies and how to ensure their adequate incidence by proper piping, etc.: boilers and oil burners; the building of paths, floors, etc., in brick and concrete; wood working; the making and maintenance of roofs and buildings; finally those odd jobs that are all important, but which the ordinary mortal puts off doing for want of practical knowledge. It seems to us that this book might be of value, not merely in the U.K., for whose horticulturists it was primarily written, but also for the not too practically minded townsman turned horticulturist in every English-speaking land. D.A.

1246. Shoemaker, J. S., and Teskey, B. J. E.
Practical horticulture.
John Wiley, N. York, Chapman & Hall, London, 1955, 9 × 6 in. pp. 374, bibl., illus., $4.20 or 34s.

Is this book, despite its title, going to teach anyone horticulture? It is pleasantly written, pleasantly illustrated and it touches on the cultivation of just about all important horticultural plants in the northern U.S.A., a little on each crop or plant. But it seems to the reviewer that its appeal is essentially to the armchair town dweller who may like to be able to inform his grand-daughter, lately gone to live on the land, that "Matthiola (stock or gilliflower) particularly the ten-week type occurs in a range of colours, is 1-1½ ft. high, and is grown for its fragrance in the evening." The illustrations, on the whole, largely concern field operations such as the sowing of onion seed with an 8-row gang seeder or transplanting tomato plants by machine. The onion is undoubtedly photogenic and the written section on onions is fuller than most, but even here the practical man would not find the answers to many of his questions. Fruits, vegetables and flowers, including houseplants, are all put through the hoop. The authors are skilled men of long experience and it is perhaps absurd to quarrel with them for trying to put into one small book information which merits an encyclopaedia. Dip into it at any point and if, like the reviewer, you tend after luncheon to dilettantism, you will fall for it wholeheartedly and be ready for your grand-daughter's next visit, but if you want to practise horticulture you might do best to learn first and read afterwards. The authors point to the ideal, but to attain it you will have to get the hired man. D.A.

1247. Swaine, D. J.
The trace element content of soils.
Tech. Commun. Bur. Soil Science, Harpenden, **48**, 1955, 9½ × 7½ in. pp. 157, bibl. 708, 25s.

A brief introduction and notes are followed by tabulated information on 44 elements as regards the following points: place where study was made, number of samples used, soil content, method and remarks, and references. The following elements are omitted: O, Si, Al, Na, K, Ca, Mg, Fe, P, C, N, S and the halogens.

1248. STANFORD RESEARCH INSTITUTE AND OTHERS.
Proceedings of the Third National Air Pollution Symposium, 727 West Seventh St., Suite 500, Los Angeles 17, Calif., 1955, pp. 230, illus., $5.75.

This valuable symposium contains 29 papers on different aspects of a growing problem. Those of immediate interest to horticulturists are abstracted in the present number [see abstracts 25, 26 and 662].

1249. STELLWAAG, F., AND KNICKMANN, E.
Die Ernährungsstörungen der Rebe, ihre Diagnose und Beseitigung. **(The nutritional disorders of the vine, their diagnosis and cure.)**
Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1955, 9 × 6 in., pp. 78 + 2 coloured plates, bibl. 114, illus., DM. 5.60.

The widespread incidence of mineral deficiencies in vineyards at present is the penalty for harvesting greatly increased grape crops in recent times, thanks largely to improvements in plant protection, training and varieties. Shortage of fertilizers during the war and drought in several seasons since have further aggravated the position. In these circumstances the appearance of this book, apparently the first written on this specialized subject, is a welcome event. Professor Stellwaag—supported by his colleague, Professor Knickmann, who deals with soil aspects—embodies in it the results of nearly twenty years' extensive research at Geisenheim, thus providing for viticulture, what Wallace [*H.A.*, 22: 2007] and Mulder [23: 3959 and 24: 2401] have provided for agriculture and fruit growing respectively, a scientific basis for the diagnosis of nutritional disorders.

Following introductory remarks the longest chapter of the book (IV; pp. 15-43) is devoted to a description of symptoms that appear in vines when one or more of twelve nutrients or water are deficient. Chapters V-IX deal with symptoms of disorders due to the excess of certain elements, unfavourable soil and climatic conditions, with chlorosis and with leaf symptoms produced by a variety of factors, including genetical chlorophyll defects, autumn colouring and suspected virus diseases. The use of water culture and infection techniques and plant and soil analyses for diagnostic purposes are described in chapters X and XI. Two final chapters and an appendix present, in turn, methods of curing mineral deficiencies in the vineyard, a key for identifying the causes of leaf discoloration and a technique for preserving the natural colour of vine leaves kept for long periods. Many black and white and 18 coloured photographs illustrate the symptoms discussed in the text. V.H.G.

1250. SYMONS-JEUNE, B. H. B.
Natural rock gardening.
Country Life, London, 3rd edition, 1955, $9\frac{1}{2} \times 6$ in., pp. 168, illus., 30s.

This is the third edition of a well-known book, revised, reset, and, we suspect, repriced. Mr. Symons-Jeune is renowned for the superb rock gardens which he has in the past constructed at the R.H.S. Chelsea Shows and elsewhere, causing despair to competitors and leaving most rock garden owners with a permanent inferiority complex. The author is not so selfish as to keep the mysteries of his art to himself. The object of this book is to explain how he does it and how, given about five hundred tons of Westmorland limestone, a bottomless purse and the landscape eye of a Capability Brown, you, gentle reader, can do it too. That you will also need wheelbarrows, a number of strong men and a travelling crane or two is not mentioned. That at least is the impression conveyed in the opening chapters. But somewhere about chapter X, when the reader, now less gentle, is in a frenzy of frustration over the many beautiful photographs of natural and constructed rockscapes that he can never hope to emulate, there appears a character who casually remarks that he has £25 and would like a nice rock garden. The author, instead of falling dead, accepts the challenge, and the result for readers is a stimulating and well-illustrated account of how a delightful rock garden can be built up with a minimum of material. The lessons learnt on large-scale operations are now seen applied to the formation of the miniature, the result is no less delightful and the small garden owner can take heart. The emphasis of the book is on nature, the production of a natural effect by the disposal of the rocks, on creating a landscape value rather than a precarious home for choice alpines. The technique of building is closely examined, and it soon becomes clear that there is much, much more in it than meets the eye, and this not only because a good part of the construction is subsequently buried. It is, in fact, a scientific process based on a number of "simple" rules, not made arbitrarily, but, because, if they are not followed, the natural look will not be achieved. Their simplicity may be judged from the fact that they take nine chapters to elaborate. Thirteen more chapters complete the book. These deal with various kinds of stone, small gardens and the effects to be obtained with water, conifers, stone chippings, turf and colour and with other matters. In this carefully thought out book nothing is left to chance and very little to the imagination. No one contemplating making a rock garden should fail to study it. It will make him think—possibly twice!

G.St.C.F.

1251. WISHART, J., AND SANDERS, H. G.
Principles and practice of field experimentation.
Tech. Commun. Commonw. Bur. Plant Breed. Cambridge, **18**, second edition, 1955, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 133, bibl. 17, 21s.

When Fisher first taught mankind to talk about "statistics" instead of "weighing evidence", there were many who could not see that the difference was significant. Since then it has been well said that the world was full of bulletins written by the élite, who had ploughed through to Chapter VII of his book, for the ignorant masses who had mostly got stuck somewhere in Chapter II. On the whole these bulletins were a dull lot and deserve the obscurity that has befallen them, but one or two were really good. Perhaps the best was "Wishart and Sanders", though strictly this belonged to a different genre, for the authors were well past Chapter

VII and really knew their stuff. Only the other day the reviewer was lamenting that "W & S" was out of print and there was nothing to replace it for the novice. Now, as if in answer, a second edition has appeared twenty years after the first. No doubt it will receive a welcome, nor is there any doubt that it deserves to.

That is not to say that the work is ideal. For example, no collaboration ever showed more clearly who wrote what. W provided the mathematics and S the field experience, and they do not always meet in the middle; where they do, it is not clear that they always agree—though if they think so, it is not for others to deny it. To a modern reader this dumb-bell pattern, which consists mostly of ends with very little middle, appears as an important defect, but it is inherent in the design of the book, and no rewriting could have remedied it. Also, it is a pity that the bringing up to date has been so spasmodic; a few references of the 1950's give a spurious air of modernity, whereas the bulk of the text is still of 1935 vintage. Thus, no one these days goes on believing that plots of $\frac{1}{50}$ to $\frac{1}{40}$ acre are inherently better than those of other sizes. A final criticism, in 1935 there was not much experience with plantation crops and the first edition largely ignored them; it cannot be said that the second is any better, and in 1955 such omissions are serious.

Nevertheless, although the defects need to be noted, this is a very useful book. At least it does start at the beginning, and it makes no pretence of going right to the end of the story before stopping—both considerable virtues in a book written for the uninitiated, who need the elements and also a realization of what they do not know. S.C.P.

1252. WITTE, K. AND OTHERS.
Klimatologische, pflanzenphysiologische und technische Probleme der Beregnung.
(Climatological, plant physiological and technical problems of sprinkler irrigation.)
Verlag Wasser u. Boden, Hamburg, 1954, 8½ × 6 in., pp. 203, bibl. 43, illus., D.M. 9.60, being *Schriftenreihe Kurator. Kulturbauwesen*, Heft 3.

If the spectacular improvement in soil fertility due to the use of artificial fertilizers is to be matched by another great rise in crop yields during the second half of the century we have to turn to irrigation for the realization of our hopes. As a contribution towards this aim the author, who has already published one book on his work [*H.A.*, 24: 3294], continued his studies at Marhof, the agricultural experiment station of Bonn University. This new account in book form of his latest work on sprinkler irrigation is divided into two parts, entitled, respectively, *Further studies on the effects of increased air humidity and soil moisture on cultivated plants* (pp. 11-79, bibl. 19) and *Studies on the mode of action of various sprinklers in the field* (pp. 85-196, bibl. 24).

The first part takes the form of a progress report of research, the initial stages of which were discussed in the earlier book. The results obtained have shown that under Central European conditions, the benefits from sprinkler irrigation at night combined with a fine spray by day are particularly significant for late and probably also for early crops, but they should be even greater in subtropical and arid regions. Although it is difficult to isolate the effects of individual factors, it can be stated that the chief advantage of a fine, discontinuous spray applied during the heat of the day lies in the maintenance of (1) a fairly constant air humidity without a marked drop in temperature and (2) a high rate of photosynthesis thanks to the stomata remaining open in the moistened leaves. In his physiological studies, which yielded much interesting information, Witte had the co-operation of 3 plant physiologists of the Technische Hochschule, Darmstadt.

In the second part 4 types of sprinkler in which many makes are represented are discussed with special reference to structural details and to performance as recorded in tests at Marhof. Two further chapters are devoted to the problems of range and density of precipitation and to nozzles. Naturally, the author had to confine his tests to equipment available on the German market, but his approach and his methodically presented data deserve study elsewhere. V.H.G.

1253. WORK, P., AND CAREW, J.
Vegetable production and marketing.
John Wiley, N. York, Chapman & Hall, Lond., 2nd edition 1955, 8½ × 5½ in., pp. 537, bibls., illus., $4.75 or 38s.

The first edition, by the senior author, was issued in 1945 [see review *H.A.*, 6: 1704]. The layout of the present edition remains essentially the same and thus ensures a neat, compact bit of work, but where advance has been made in particular fields at least mention of this is made in the new edition, and in all cases the references cited at the end of each section have been brought up to date and variety lists have been revised in the sections referring to particular crops.

Rather more than half the book is devoted to such general subjects as vegetable farm management, marketing, equipment, how plants grow, the seed problem, soils and vegetables, irrigation, insects and diseases, storage and exhibition. The following crops are then considered:—potatoes and sweet potatoes, tomatoes, sweet corn, root crops, peas and beans, vine crops, onions, brassicas, celery, lettuce, spinach, asparagus and rhubarb. General principles rather than hard and fast rules are laid down on how particular crops should be cultivated and the reader is expected to adapt them to his particular conditions. This makes the book useful and acceptable to the student and vegetable grower outside the eastern United States. Among subjects which have received considerable additional attention or attention for the first time in this edition are soil conditioners, green manuring, statistical analysis, chemical weed control, new insecticides and the use of hormone sprays to set tomatoes. The general principles enunciated still hold good and are set out clearly and persuasively. D.A.

1254. WRIGHT, R. C. M.
Plant propagation.
Ward Lock, London, 1955, 9 × 6½ in. pp. 192, illus., 25s.

It is refreshing to find a comprehensive work heralded by a modest publisher's note on the dust cover. Mr. Wright set out to produce a practical book for the amateur and he has certainly succeeded. In fact, he has given us a clear and concise introduction to the wide field of propagation eminently suited to students and professionals as well, and all will be grateful for the clarity of both text and illustration.

Mr. Wright acquired his scientific knowledge of plants at the John Innes Horticultural Institution, and it follows that we are given a masterly explanation of the mechanism of plant inheritance and its exploitation for plant improvement. Seed raising equipment, harvesting and storage, the germination process, seed sowing in the open, and under glass are all dealt with most adequately. Descriptions of the various modes of vegetative increase are well done, whether it be by cuttings, layers or grafts. In dealing with rootstocks for apples, pears, plums and cherries in a hundred lines, there are bound to be some inadequacies but, even so, how much better this is handled here than in many larger tomes. Careful lists of plants of interest have been compiled and these have been arranged alphabetically under headings such as trees and shrubs, alpines, herbaceous perennials, water plants, bulbous plants, annuals and biennials. There are also separate chapters dealing with hardy fruits, vegetables and culinary herbs, and the more popular plants for the greenhouse. A brief chapter on pest and disease in relation to propagation ends the book, but not at all dismally.

This is an altogether efficient book, moving along smoothly from start to finish. It covers a wide field but is able to do this adequately for its purpose with a commendable economy of words.

R.J.G.

Annuals and reports.

1255. CALIFORNIA.
Thirty-fifth Annual Report of the State of California Department of Agriculture, period ending December 31, 1954.
Bull. Calif. Dep. Agric., 1954, **43**: 137-416, illus.

The following are a few among the many items described in this report: *Bureau of Entomology*: control problems of pests of deciduous fruits, grapes, nuts and vegetables; fumigation of artichoke plume moth larvae with methyl bromide; reduction of injury to fruit budwood by sufficient aeration after methyl bromide fumigation. *Bureau of Plant Pathology*: Surveys of virus diseases of peaches, citrus, and grapes; *Sclerotiium rolfsii* on gladiolus, and parasitic nematodes. *Bureau of Chemistry*: fertilizer and pesticide regulations. *Bureau of Market News*: prices obtained for fruit and vegetables.

1256. CAWTHRON INSTITUTE.
Annual Report of the Cawthron Institute 1954-55, 1955, Nelson, N.Z., pp. 48.

Soil investigations: survey of tomato soils in the Nelson area. *Plant nutrition investigations:* molybdenum nutrition of hops, tobacco and peas; mineral composition of hop cones; sugars in hop plants. *Fruit research:* deficiencies of copper and magnesium in apples; apple rootstock trials. *Raspberry investigations:* trace element studies; variety trials; permanent manurial trials. *Tomato research:* soil sterilization; soil amendments; effects of pruning on yield and quality; nutrition; variety trials; sawdust mulch for field tomatoes. *Hop research:* fertilizer experiments; boron, magnesium and suspected molybdenum deficiencies; development of hop cones; resin content; disease investigations. *Tobacco research:* black root-rot; varietal resistance to *Verticillium* and *Phytophthora*; effect of fertilizer on tobacco leaf; chemical control of laterals; chemical composition of varieties.

1257. CEYLON (JOACHIM, A. W. R.).
Administration Report of the Director of Agriculture for 1954, Part IV—Education, Science and Art (C) 1955, pp. 137, Rs. 4.15 + 35 cents postage.

This report includes information on the following, among other, research activities: *Tea Research Institute:* Tea soils, low-temperature withering, vegetative propagation, green manures, shade trees, herbicides, manuring, blister blight and other diseases. *Rubber Research Institute:* fungicide spraying from the air, manuring, mineral deficiencies, clonal introductions and latex studies. *Coconut Research Institute:* Replanting, manuring, vinegar production from toddy by a new process. *Division of Botany:* Onion manuring. *Sugar Cane Division:* Breeding, variety trials, drainage, spacing, time of planting and manurial trials, maturity testing. *Division of Chemistry:* Cacao sickle leaf control, Mg and Ca deficiency control in mango with dolomitic limestone, tobacco manuring and trace element trials, areca manuring, citronella grass fertilizer trials. *Division of Entomology:* Pineapple wilt and mealybug control, onion thrips control. *Division of Plant Pathology:* Chilli soil fumigation. *Division of Horticulture:* Cacao selection, propagation by single-leaf and stem cuttings and manuring, citrus stock-scion trials, rooting of betel and pepper cuttings, mango variety trial. *Tobacco.* Economics, variety and manurial trials, cultivation on paddy land. [See also separate abstracts.]

1258. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA.
Sixth Annual Report C.S.I.R.O. for the year ending 30th June, 1954, Canberra, 1954, pp. 179, 10s. 6d.

Among the headings in this report are: *Plants:* microbiology; fruit investigations; oil crops; tobacco investigations; nutrition; physiology; biochemistry. *Irrigation:* research at Merbein and Griffith. *Entomology:* biological control. *Food:* physics; chemistry; fresh fruit and vegetable storage and transport; dehydrated foods; frozen fruits and vegetables; dried vine fruits. *Plant fibres:* agricultural, processing, microbiological, chemical and physical investigations. *Atmospheric physics:* frost prevention; cloud and rain physics (artificial rain formation). [See also separate abstracts.]

1259. CYPRUS (JONES, D. K.)
Annual Report for 1954. Annexure III. Annual Report of the Agricultural Officer (Research) for 1954, 1955, pp. 123.

This report includes information on: *Crop investigations:* broad bean fusarium root-rot resistance and other variety trials, and a cereals *vs.* oil crops trial which includes safflower. *Seed production:* vegetable seeds for export and local use, and flower and tobacco seed for local use.

1260. DIRECTIE VAN DE LANDBOUW, 's-GRAVENHAGE
Tuinbouwkundig Onderzoek, Jaarverslag 1954. **(Annual Report of Horticultural Research, 1954.)** Ministry of Agriculture, The Hague, 1955, pp. 439.

This publication on horticultural research in the Netherlands, which is printed for the first time, has grown in 10 years from a stencilled report of experiments carried out by some advisory officers to an almost complete report of the projects at the many institutions engaged in research on horticulture and related subjects. Reports from the following are included: the laboratories and institutes at Wageningen; the Royal Netherlands Meteorological Institute at De Bilt; the Onion Federation at Middelharnis; the Biological Station at Wijster; the Institute for Applied Biological Research in Nature at Arnhem; the Experimental Stations at Aalsmeer, Alkmaar, Boskoop, Lisse, Naaldwijk, and Wilhelminadorp; the Laboratory for Irradiation Research in Horticulture at Utrecht; the Department for Economic Affairs at The Hague; and the State Advisory Services. The reports give short, scientific accounts of work in progress, with results. They have been systematically classified under the following chapters: general; fruit growing; vegetable growing (including mushrooms); floriculture; bulb growing; tree and shrub growing; herb and tobacco growing; seed growing; and bee-keeping. The final chapter lists publications.

1261. D.S.I.R., N.Z.
29th Annual Report of the Department of Scientific and Industrial Research, New Zealand, for 1954-55, Wellington, 1955, pp. 76, 3s.

The following are among results reported briefly: Streptomycin reduced the number and size of lesions caused by blast on peaches and has shown promise against blossom blast of pears. Blossom applications of NAA or DNC effectively thinned apples. Control of grey mould on parthenocarpically-developing tomatoes was obtained by a combined hormone-ferbam spray. Germination of 80-90% with hop seed was obtained after stratification at 35-40° F. for 6 weeks. Growing hops on wirework higher than 14 feet did not influence brewing value; hill spacing wider than 6 feet by 6 feet consistently decreased yields. Tobacco seed beds were effectively sterilized with methyl bromide. Copper deficiency in tobacco was corrected by applications of 40 lb./acre of bluestone before planting. Current projects are listed, and those of the Crop Research Division, Entomological Research Station, Fruit Research Station, Hop Research, Plant Diseases Division and Tobacco Research contain items of horticultural interest.

1262. FAO.
Activities of FAO under the Expanded Technical Assistance Program, 1954-55, 1955, pp. 99, illus.

The following are among the agricultural projects described briefly; expansion of coffee production in Ecuador, olive and fruit fly control in Libya, fruit growing and pest control in Syria, and fruit growing on reclaimed land in the Gebel district of Tripolitania.

1263. FAO.
Fats and oils No. 6.
FAO Commodity Rep., 1955, pp. 67.

Continuing its long-term upward trend, world production of fats and oils in 1954 reached a new peak. Production in the world outside the U.S.S.R. was well over 23 million metric tons and was about 5% higher than in the previous year. Production has increased since 1950 at an average rate of about 2% a year, following a rapid recovery from a low level at the end of World War II. There has been a slight increase in production per person: output is now about 25% above pre-war, while population has increased only about 20%, but consumption has not increased in all regions. Among the products for which details of production, trade and prices are given are those derived from olive, coconut, oil palm, castor and tung.

1264. ILLINOIS (HUDELSON, R. R.)
Research Progress at the Illinois Agricultural Experiment Station. Report for 1952-1954, Urbana, 1955, pp. 135.

Horticulture (pp. 97-106). Brief mention is made of tomato colour studies, chemical thinning of peaches, the ill-effects of using 2,4,5-trichlorophenoxypropionic acid as a pre-harvest spray for apples, strawberry fruit composition, apple and peach maturity tests, new strawberry, raspberry and chrysanthemum varieties, captan for the control of strawberry grey mould, apple and pear fireblight studies and cut flower storage studies. Current research projects are listed.

1265. I.N.É.A.C.
Rapport annuel pour l'exercice 1954. **(Report of the work of the I.N.E.A.C. Stations, 1954.)**
Publ. hors Sér. Inst. nat. Ét. agron. Congo belge, 1955, pp. 492, 160 fr. belg.

The volume includes reports from Yangambi research station and various substations. The Yangambi report covers the following subjects: *Oil palm:* breeding and selection, progeny trials including *melanococca* × *guineensis* hybrids, phenology, cultural experiments on clearing, maintenance, intercropping, manuring, germination, planting, protection after planting, poisoning, disease and pest control. *Hevea:* breeding, and selection including preselection and progeny trials cultural experiments including clearing, spacing, intercropping, tapping, stock-scion relationships, standardization of rootstocks, yields in relation to soil types, disease control, ringing and poisoning. *Coffee:* breeding and selection, progeny trials, cultural experiments including spacing, cover crops, shade trees, pruning, manuring, seedlings *vs.* grafted plants *vs.* cuttings, floral biology, phenology, studies on rooting cuttings including those of *C. congensis*, storage of cuttings in plastic films, pest and disease control, leaf analysis. *Cacao*: selection and progeny trials, propagation by fan and chupon cuttings, cultural experiments including clearing, temporary and permanent shade, manuring, floral biology, root system studies. *Food Plant Division*: banana, *Musa textilis*. *Phytopathology* and agricultural entomology: pests and diseases of coffee, cacao, oil palms, citrus, insecticides, fungicides herbicides, spray apparatus. *Genetics:* oil palm, hevea, coffee, cacao, banana. *Plant physiology:* mineral nutrition of oil palms, cacao, robusta coffee. *Economic plants: Piper nigrum, Vanilla planifolia, Rauwolfia vomitoria, Tabernanthe iboga, Cananga odorata.* The principal horticultural crops mentioned in the reports of the research centres in other regions of the Congo are: *Lower Congo*: citrus, avocado, mango, pineapple, banana, strawberry, asparagus, tung, sisal, hevea, cacao, coffee, oil palm. *Central Congo:* hevea, oil palm, coffee, cacao. *North:* banana, robusta coffee. *South:* banana, oil palm, sugar cane, coffee. *Katanga:* apple, peach, citrus, avocado, tomato in soilless culture, tobacco. *Kivu:* arabica coffee, tung, tea, cinchona, pyrethrum, eucalyptus, ramie, medicinal and essential oil plants. *Ituri:* tobacco, cinchona, robusta coffee, tea, mulberry. *Ruanda-Urundi:* arabica coffee, castor bean, tobacco, banana.

1266. Institut National de la Recherche Agronomique, Paris (I.N.R.A.)
Rapport annuel 1952.
(Annual Report of the National Institute for Agronomic Research, Paris, for 1952),
1955, pp. 328.

Brief notes are given on the research conducted at the various stations under the control of the Institute. Horticultural research included the following subjects: *Agricultural bioclimatology:* Spring frost control. *Agronomy:* Vine leaf analysis, rose-bush composition in relation to manuring, castor bean non-fatty acids, functions of chlorophyll, cider apple manuring, cherry decline in eastern France. *Plant physiology:* Effect of TMV on leaf composition, active principles of tomato juice, production of healthy plants from meristematic tissues of virus-diseased plants, culture of excised tomato ovaries, fruit set in Doyenné du Comice pears. *Genetics and plant breeding:* Crops studied were pome and stone fruits, nuts, vines, hops, vegetables and sugar cane. *Plant pathology:* Fungal and virus diseases of top fruits, nuts, small fruits, vines, hemp, essential oil plants, flowers and vegetables. *Technology* of fruit and fruit products. [See also *H.A.*, 24: 3301 and separate abstracts on vines and hops.]

1267. Iowa.
Your Division of Agriculture reports 1954-55,
being ***Annual Report of the Division of Agriculture of Iowa State College for 1954-55,*** 1955, pp. 65, illus.

This popularly written report includes information on rose varieties for Iowa, rose breeding and varieties resistant to black spot, petunia varieties for Iowa, geranium breeding and variety trials, strawberry yield and herbicide trials, orchard fungicide and insecticide trials, raspberry breeding, the new fireblight-resistant apple variety A611, vine root system studies, muskmelon pest control and variety studies, pea spacing, tomato variety trials and vegetable breeding.

1268. Jamaica.
Investigations 1953.
Bull. Dep. Agric. Jamaica **53**, pp. 163, 2s.

Investigations reported include: *Economic entomology:* Pests of sugar cane, citrus, pineapples, castor and stored ginger. *Field crop: Furcraea gigantea*, sisal, *Agave fourcroydes, Phormium tenax*, castor and sugar cane. *Plant pathology:* Banana and cacao diseases. *Soils and fertilizers:* Carrot, krilium and fertilizer trials. *Cultivated trees, shrubs and vines:* Banana breeding, propagation and management; cacao introduction, propagation and variety trials; cashew selection; citrus propagation and management; coconut management; coffee selection and management; oil palm introduction and variety trials; pineapple introduction, testing, propagation, canning and herbicide trials. *Vegetables.* Tomato fertilizer trials. [See also separate abstracts.]

1269. Jordan Ministry of Agriculture.
Second Annual Report 1953 of the Agricultural Research Service, Deir Alla Research Station, pp. 32 + XII, 100 fils.

Most of the experimental work was carried out at the new Deir Alla Research Station and to a lesser extent at the Jubeiha and Jericho nurseries. *Mentha piperita* showed promise in preliminary trials. *Vegetables.* The most promising varieties were: cabbage—Early Primo; cauliflower—Gloria, Six Weeks, Snowball and September Heading; tomato—Marmand, Beat All, Stonor's M.P., Midday Sun, Yates Express and Perfection. The root vegetables investigated included beet, spinach beet and turnip. *Vines.* Eight varieties and 3 rootstocks were used in a method-of-support and 2 variety trials. *Weed control.* Preliminary experiments with herbicides were started.

1270. Long Ashton.
Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol, 1954, 1955, pp. 207, bibls., illus.

An introduction by the Director, briefly summarizing research and other activities, is followed by separate scientific papers on pomology, plant nutrition, plant pathology, cider, food preservation and statistics. [See also separate abstracts.]

1271. Malaya (Heath, R. G.)
Annual Report of the Malaya Department of Agriculture for the year 1954, 1955, pp. 78, illus., 4s. 8d.

Work is reported on a wide range of crops, including: *Oil palms*: Breeding and selection of dumpy, normal tall, pisifera and tenera material; kernel extraction; "crown disease" due to *Oryctes rhinoceros*; biological and chemical control of bagworm, *Cramestopsyche pendula*, causing defoliation. *Coconuts:* Selection and breeding; possibilities of biological control of *Oryctes rhinoceros* by *Scolia ruficornis*. *Pineapples*: Selection and breeding with special reference to Singapore Spanish; manuring; ridging and spacing [see also *H.A.*, 25: 1049]; composition; canning; pests and diseases. *Cacao:* Selection; breeding; leaf sampling; manuring; spacing; thinning; nursery practice; processing; pests and diseases. *Tea*: Selection; manuring; pruning-cum-disease control; intercultivation; blister blight. *Coffee:* Manuring; intercultivation/spacing; shade/variety. *Ramie:* Varieties. *Manila hemp:* Varieties; insect pests. *Phormium tenax. Vegetables. Cloves:* Pests; diseases, namely, *Cryptosporella eugeniae* dieback and a restricted form of *Valsa eugeniae* sudden death, neither previously recorded outside Zanzibar. *Banana:* Manuring. *Rambutans:* Clones, propagation. *Durians:* varieties. *Cashews:* Varieties.

1272. MAYAGÜEZ, PUERTO RICO.
Report of the Federal Experiment Station in Puerto Rico, 1953, 1953, pp. 28 [received 1955].

This report includes short accounts of research on various crops under the following headings: *Insecticidal crops:* derris breeding, absorption and translocation, mamey [*Mammea americana*] fruit toxicity to mammals. *Drug crops: Strophanthus* cultural requirements, trials of *Dioscorea* spp. as possible sources of cortisone. *Food crops:* macadamia seed germination studies. *Plant introduction and propagation:* Hevea fruit size and set, mono grafting. *Bamboo:* harvesting, propagation. *Vanilla:* culture, breeding, root rot control [see abstract 812] mulching. *Coconuts and mangoes:* dwarf *vs.* common coconuts, mango grafting, mangosteen transplants. *Weed Control:* effect of 2,4-D and CMU on nutgrass, persistence of CMU in the soil, herbicide evaluation.

1273. MINISTRY OF AGRICULTURE, LONDON.
Report on the National Agricultural Advisory Service. The first eight years, 1946-1954, 1955, pp. 62, illus., 3s. 6d.

This report gives a general account of the development of the N.A.A.S. and includes information on organization, including staffing; horticultural inspection work, including crop certification, statutory inspections and the inspection of plants exports; horticultural experiments; and the experimental horticulture stations.

1274. NORTH CAROLINA.
Forward together, being ***Annual Reports North Carolina State College, School of Agriculture 1950-54,*** pp. 39, illus.

The combined annual reports of the North Carolina Agricultural Experiment Station for 1950/54, which form part of this semi-popular publication (pp. 3-19), consist of very brief research notes. Three sprays of 100 p.p.m. streptomycin applied during blossoming gave very good control of fireblight on apples in 1954. Gladiolus losses from fusarium basal rot and yellows have been greatly reduced by pre-storage soaking in sodium trichlorophenate solution followed by preplanting soaking in ethyl mercury phosphate solution. Soaking freshly harvested narcissus bulbs in phenyl mercury acetate solution controlled fusarium basal rot. Successful new soft fruit varieties are the Albritton strawberry and the blueberries, Angola, Croatan, Murphy and Wolcott. Other subjects studied were apple, peach and bean pests, damping-off in vegetables and peach pruning.

1275. NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.
Guide to Experiments and Demonstrations 1955-6, Aberdeen, 1955, pp. 101, maps.

In the horticultural department at Craibstone Farm there is a commercial glasshouse unit, a Dutch light unit, outside culture of fruit and vegetables, with 2 acres devoted to the Scottish National Fruit Trials of blackcurrants, raspberries, strawberries and plums. There is also a 2-acre horticultural section on Aldroughty Farm, Elgin.

1276. RHODESIA AND NYASALAND.
Annual Report of the Secretary to the Federal Ministry of Agriculture for the year ended 30th September, 1954, 1955, pp. 115.

This report contains that of the Director of Research and Specialist Services which includes information on the following subjects. *Field husbandry:* dwarf castor beans. *Horticulture:* deciduous and subtropical fruits including citrus, vegetables, and Rhodes Inyanga orchards (apple DNOC spraying, yields, variety trials and deficiency diseases).

1277. ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1954. **(Information and Research in the Tropical Products' Department, 1954.)** [English summary pp. 14], 1955, pp. 86, bibls, illus., fl. 4.

Essential oils: Analyses of lemongrass oil from Surinam, massoi leaf oil (from *Cryptocarya massoia*) from New Guinea and cedar wood oil from Kenya. *Pest and disease control:* Derris application for *Malacosoma neustria* on elm trees, preparation of dusting sulphur for the tropics. *Gums and resins:* Examination of "Tiengie-monie" resin from the bark of *Protium* sp., resin from *Canarium mehenbethene* and frankincense. *Fibres:* Testing and degumming of ramie. *Fruit:* note on West Indian cherry (*Malpighia punicifolia*). [For administration report see 1285o.]

1278. TRINIDAD AND TOBAGO.
Administration Report of the Director of Agriculture, Trinidad and Tobago, for the year 1954, 1955, pp. 98, $1.20.

Investigations in progress include: *Cacao:* clonal and fertilizer trials, breeding and selection of witches' broom resistant clones, mulching, soil conditioner and rooting of cuttings trials. *Sugar cane:* variety trials. *Citrus:* studies on fertilizers and cover crops, rootstocks transplanting, tree and field management, orange harvesting, lime dying-out disease and withertip resistance. *Tropical and subtropical fruits:* windbreak studies, propagation by cuttings. *Coconuts:* selection, red ring disease studies.

1279. WEST BENGAL.
Annual Report of the Directorate of Agriculture, West Bengal, for the year 1952-53, 1955, pp. 48, Annas 10 or 1s. 1d.

Information is given on the following, among other, Sections: *Crop research:* Castor; coconuts. *Horticulture:* Bananas: varieties, mutants, suckers (pruning before planting-cum-size of sucker), spacing and manuring; areca palms. *Sugar cane:* Manurial trials. *Mycology and Plant Pathology:* Diseases of guavas, eggplants and mangoes.

1280. WEST OF SCOTLAND AGRICULTURAL COLLEGE.
Farm and experiments 1955, 1955, pp. 78.

Tomato trials: irradiation, foliage spraying with cane sugar, breeding for resistance to *Cladosporium* leaf mould. Flower variety and cultural trials: early- and late-flowering chrysanthemums and tulips. National Fruit Trials: strawberry, raspberry, black currant and plum. Vegetable variety trials. Carrot fly control.

1281. West Virginia (Varney, H. R.)
Annual Report of West Virginia University Agricultural Experiment Station, 1954-1955.
Sci. serves your Fm, Winter 1954, pp. 28, illus.

This issue contains a brief résumé of past, present and future work in each section. In the horticultural section the following are some of the problems being studied: chemical thinning and colouring of apples, apple tree nutrition, vegetable variety trials, molybdenum nutrition of cauliflower, weed control in strawberries, blueberry breeding, and blight resistance in American chestnuts. [Reports on some projects appear as separate articles in other numbers of *Science Serves Your Farm*, and abstracts of some of these are included in the appropriate sections of this number of *H.A.*].

New periodicals.

1282. Commonwealth Mycological Institute.
Commonwealth Phytopathological News [*Commonw. phytopath. News*], 1955, Vol. **1**, Parts 1 to 4, pp. 63, Commonwealth Mycological Institute, Kew, Surrey, 5s. per year.

This new periodical, modestly described by its editor as a broadsheet, is the outcome of a resolution adopted by the 1948 Commonwealth Mycological Conference and endorsed by the 1950 C.A.B. Review Conference. Its intention is to provide up-to-date information on developments in plant pathology throughout the Commonwealth, to encourage the exchange of ideas and to give some details of the people concerned and the places at which they work. The first four numbers contain notes and short articles from many parts of the Commonwealth, the latter including accounts of diseases of several fruit and plantation crops. We appreciate the personal—one might almost say human approach to matters mycological introduced by our colleagues at Kew, and wish their new venture every success.

1283. Stazione Sperimentale di Agrumicoltura e Frutticoltura, Acireale.
Rivista di Agrumicoltura [*Riv. Agrumic.*], 1955, Vol. I, No. 1, pp. 48, illus., Stazione sperimentale di Agrumicoltura e Frutticoltura, Corso Savoia 156, Acireale, Sicily, foreign subscription L.5000 per annum or L.500 per number.

This new illustrated monthly journal is designed to provide Italian growers with information on developments in citrus growing with particular reference to cultural practices. Space is to be devoted to the essential principles of modern culture and to progress in the main citrus areas of southern Italy. In addition to the introductory editorial the first number contains papers on the history of citrus growing, the harvesting and preparation for sale of fresh lemons in California, *Tetranychus telarius* injury to lemons, and zinc and manganese deficiencies; and abstracts of papers in American citrus journals. Some of the illustrations are in colour. [See also separate abstracts.]

1284. Viêtnam.
Bulletin du Centre National de Recherches Scientifiques et Techniques [*Bull. C.N.R.S.T., Viêtnam*], 1955, No. 3/4, pp. 74, illus., Centre National de Recherches Scientifiques et Techniques, Ministère de l'Education Nationale, Viêtnam.

This new bulletin, issued with American economic aid, replaces the Bulletin Bibliographique de la Direction des Recherches Agronomiques et Pastorales. The latter appeared twice, hence the number 3/4 on the first issue of the new publication. In addition to abstracts it will publish monographs, studies and reports on tropical agriculture, botany, ecology and other subjects. The section on tropical agriculture in the present number consists of 2 papers on tea, both of which are abstracted separately.

Noted.

1285.

a Alberta.
Annual Report of the Department of Agriculture of the Province of Alberta for the year 1954, 1955, pp. 173.

b Andrewartha, H. G., and Birch, L. C.
The distribution and abundance of animals. University of Chicago Press, Chicago, Cambridge University Press, London, and Toronto University Press, Toronto, 1954, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 782, bibl. pp. 41, figs., maps., $15.00 or 112s. 6d.
A major work on insect ecology.

c British Columbia.
Climate of British Columbia. Tables of temperature, precipitation, and sunshine. Report for 1954, 1955, pp. 37.

d FAO.
The work of FAO 1954-55: Report of the Director-General.
[*Publ.*] *FAO* **C55/8**, 1955, pp. 123. $1.00 or 5s.

e FAO.
Yearbook of Food and Agricultural Statistics, 1954, Vol. VIII, Part I, Production. [English, French and Spanish], Rome, 1955, pp. 411, $3.50 or 17s. 6d.

f Fruit and Vegetable Canning and Quick Freezing Research Association.
Annual Report and Accounts 1954-5, Chipping Campden, Glos., pp. 27.
Marked private and confidential.

g Instituut voor Toegepast Biologisch Onderzoek in de Natuur, Arnhem.
Verslag over het jaar 1954. **(Report for 1954 of the Institute for Applied Biological Research in Nature, Arnhem.)**
Meded. Inst. Toegep. biol. Onderz. Nat. **21**, 1955, pp. 32.

h Ireland, Department of Agriculture.
23rd Annual Report of the Minister for Agriculture 1953-54, Dublin, 1955, pp. 190 + appendices pp. 87, 8s. 6d.

i JAMAICA.
Annual Report of the Department of Agriculture, Jamaica, for 1953, 1954, pp. 69, 3s. 6d.
See also abstract 1268.

j KENYA.
Annual Report of Kenya Department of Agriculture for 1953, Vol. II, Record of Investigations, 1955, pp. 205, Sh. 7/50.
See *H.A.*, 24: 3303 and abstracts in present number.

k LUCK, J. M. (EDITOR).
Annual Review of Biochemistry, Vol. 24. Annual Reviews Inc., California, 1955, pp. 805, $7 in the U.S.A., $7.50 elsewhere.

l MICHIGAN.
Ninety-third Annual Report of the Secretary of the State Board of Agriculture, State of Michigan and the Sixty-seventh Annual Report of the Michigan Agricultural Experiment Station, July 1, 1953 to June 30, 1954. *Mich. St. Coll. Publ.*, 1955, **49**(12): 1-351.
Experiment Station work briefly reported on pp. 107-29.

m MINNESOTA.
61st Annual Report of the Agricultural Experiment Station, University of Minnesota, July 1, 1953 to June 30, 1954, 1955, pp. 38.
Including list of new projects, some horticultural. [1951/52 and 1952/53 reports also received.]

n NEW YORK STATE.
73rd Annual Report New York State Agricultural Experiment Station, Geneva, 1954, 1955, pp. 26. Publications and projects listed.

o ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Vier en Veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam, 1954. **44th Annual Report of the Royal Institute for the Tropics, Amsterdam, 1954,** 1955, pp. 80, illus.
Administration report [see also abstract 1277 for Report of Tropical Products' Department].

p SARAWAK.
Annual Report of Sarawak Department of Agriculture for 1954, 1955. Government Printer, Kuching, pp. 40.

q SCOTTISH HORTICULTURAL RESEARCH INSTITUTE.
Second Annual Report 1954-1955, Mylnefield, 1955, pp. 38.
See separate abstracts.

r SIERRA LEONE.
A.R. Sierra Leone Department of Agriculture for 1953, 1955, pp. 36, 3s. 6d.

s SINGAPORE (PURSEGLOVE, J. W.).
Annual Report of the Botanic Gardens Department for 1954, 1955, pp. 11, illus., 50 cents.
Including notable new orchid hybrids and raising orchid seedlings.

t WAITE AGRICULTURAL RESEARCH INSTITUTE.
Report of the Waite Agricultural Research Institute, South Australia, and Associated Activities of the C.S.I.R.O. 1952-1953, 1955, pp. 70.

u WHITE, P. R.
The cultivation of animal and plant cells, Thames and Hudson, Lond., 1954, 8½ × 5½ in., pp. 239, bibl. pp. 16, 35s.

v ZANZIBAR.
Supplement to the Annual Report of the Department of Agriculture, 1954, 1955, pp. 12, Shs. 1/50.
See separate abstracts.

w ZÜRICH-OERLIKON (SALZMANN, R.)
Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1954. **(Annual Report of the Zurich-Oerlikon Agricultural Research Station for 1954.)**
Landw. Jb. Schweiz., 1955, **69**: 383-445.